BIBLIOGRAPHY OF THE GROUND-WATER RESOURCES OF NEW YORK THROUGH 1967

with Subject and Location Cross Reference to the Annotated Bibliography

by
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L.E. Johnson R. A. Wilkens
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Prepared by
U.S. Geological Survey
in cooperation with the
New York State Water
Resources Commission

State of New York
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Water Resources Commisson
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INTRODUCTION

The absolute necessity of water to virtually every aspect of human life makes water the most important natural resource. With the growth in population and the increase in pollution of our lakes, streams, and aquifers, knowledge of the water-bearing zones below the earth's surface has become increasingly important.

Considerable information concerning these water-bearing strata is available in a large variety of publications. The purpose of this bibliography is to list all these references in a single publication as an aid to future studies of New York's ground-water resources.

In addition to the annotated bibliography, which summarizes the contents of each reference, a large part of this report is allocated to location and subject indexes of the references. The location index allows the reader to look under a specific area and find all publications dealing with any aspect of the ground-water resources of that area. The subject index permits the reader to look under the principal subjects related to ground-water resources and find material related to areas in New York published on a specific subject.

This bibliography represents the contributions of many individuals. Ralph C. Heath, former District Chief of the New York District, originated the annotated bibliography section, and over the course of several years Richard A. Wilkens and Richard D. Duryea made large contributions to the annotated bibliography. Additional work on the same section was done by Jordan A. Tannenbaum, John C. Kammerer, Donald E. Vaupel, and Richard H. Johnston. The senior author completed the compilation of the annotated bibliography, developed the location and subject cross-reference part of the bibliography, and prepared the text and figures. Lynn E. Johnson brought the report up to date from 1965 to 1967, adding new annotated references and including these in the subject and location cross-references. The project was completed under the guidance and direction of Garald G. Parker, former District Hydrologist.

INVESTIGATIONS OF GROUND-WATER RESOURCES

AREAL STUDIES

Published reports on the ground-water resources of New York range from detailed reports on small areas to general reports covering the entire State. Among the most detailed are a series of reports on single counties, which contain the results of studies made by the U.S. Geological Survey between 1945 and 1960. These were published by the New York State Water Resources Commission (and by its predecessor, the Water Power and Control Commission). All publications in this series are listed at the back of this report. Since 1960, most areal studies have encompassed entire drainage basins.

Figure 1 indicates the areas covered by published reports through 1967, and figure 2 shows the areas where investigations were in progress at that time.

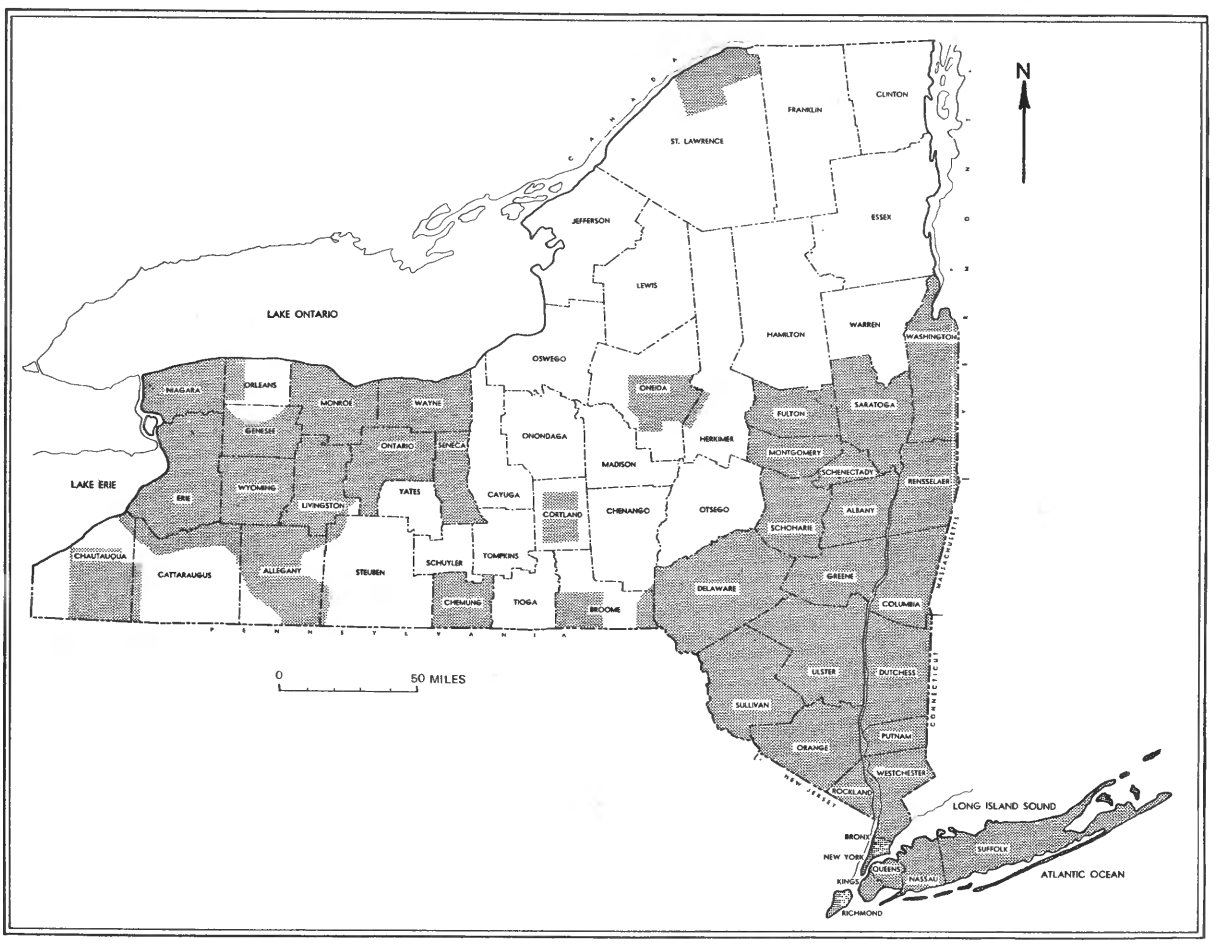

Figure 1.--Areas of New York State covered in one or more reports by the U.S. Geological Survey through 1967.

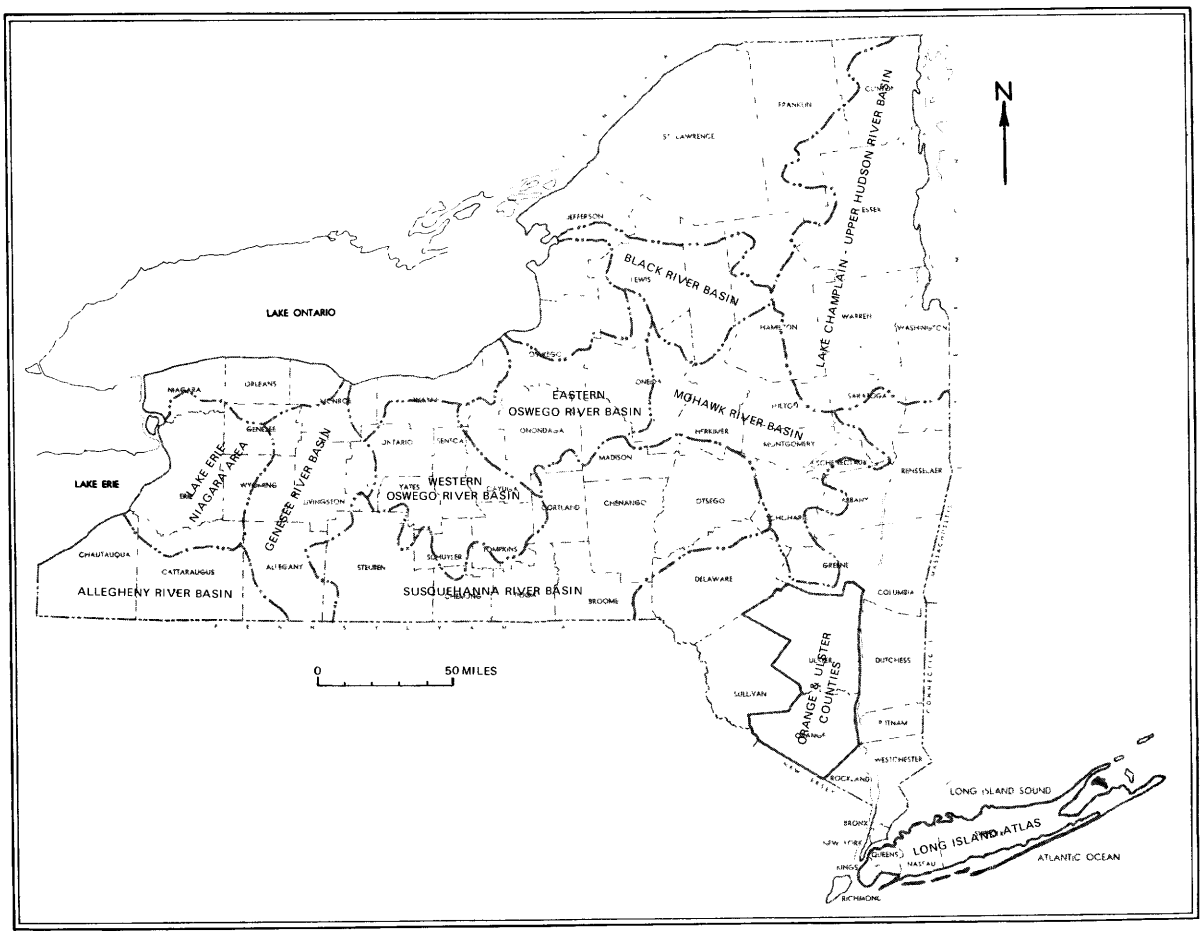

Figure 2.--Areas of New York State in which investigations are currently (1967) being pursued by the U.S. Geological Survey.

These reports and other areal reports are listed in the Location Index under the county or area that they cover. Reports on areas such as the Susquehanna River basin that include more than one county appear in the Location Index under the "Areas" section.

WATER-LEVEL OBSERVATIONS

Ground-water resources are investigated, in part, by observation and analysis of changes of ground-water storage as shown by water-level measurements in observation wells. Water levels in selected observation wells have been measured for many years in the State.

The publication of water-level measurements was started in New York in 1935 with a compilation of measurements for three wells in upstate New York and numerous wells on Long Island. These data are published in the series

of Water-Supply Papers of the U.S. Geological Survey devoted to water levels and artesian pressures in observation wells in the United States.

Figure 3 shows the locations of all observation wells, current and discontinued, in New York. Discontinued observation wells on Long Island are too numerous to be shown, but may be located by using the maps contained in U.S. Geological Survey Water-Supply Papers 1404, 1321, 1265, and 1221.

Information from all observation wells is available, and may be obtained by writing to U.S. Geological Survey, Water Resources Division, P. O. Box 948, Albany, New York 12201.

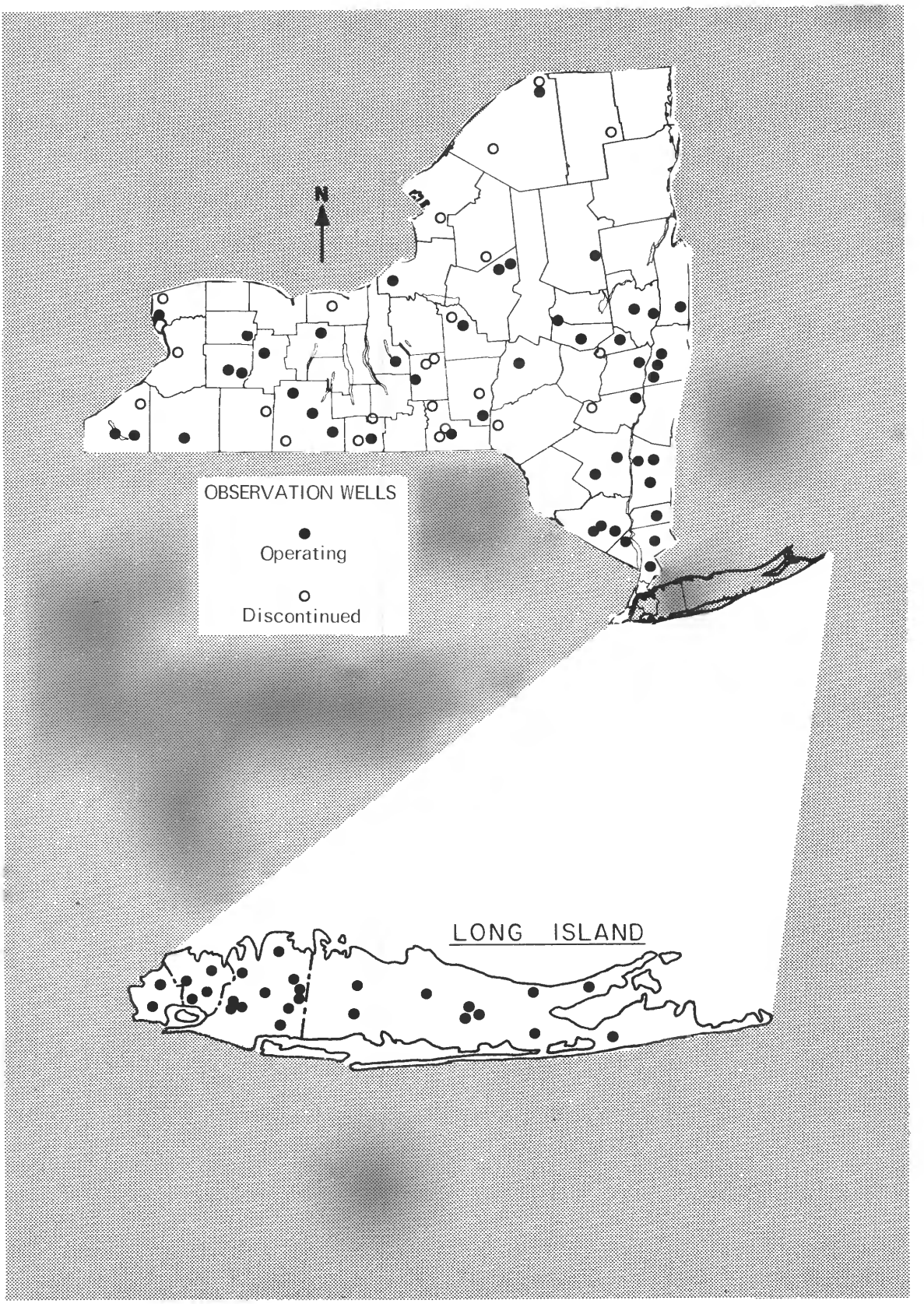

Figure 3.--Locations of observation wells in New York State, 1967.

ANNOTATED BIBLIOGRAPHY

ADAMS, A. L.

1965 New York State Water Law: Am. Water Works Assoc. Jour., v. 57, no. 1, p. 39-50.
(Discusses New York water situation in light of present water law. Defines and discusses consequences of Riparian Rights, "surplus water" doctrine and eminent domain rights for future water supply from ground-water sources.)

ADAMS, C. C.

1936 Twenty-ninth report of the director of the division of science and the state museum: New York State Mus. Bull. 306, p. 72-73, 88-96.
(Discusses reasons for ground-water investigations in New York. The main purpose of such investigations is to develop areas industrially in proportion to their water resources. Briefly mentions the ground-water problem on Long Island.)

1937a Thirtieth report of the director of the division of science and the state museum: New York State Mus. Bull. 310, p. 65-67, 127-129.
(As population increases the demand for ground water for private and industrial supplies increases rapidly. Concentration of industry and population cannot go on indefinitely without diminishing the supply and without deterioration in quality.)

1937b Thirty-first report of the director of the division of science and the state museum: New York State Mus. Bull. 313, p. 69-71, 1 fig.
(As population increases the demand for water for private and industrial use will increase. Concentrations of industry and population cannot continue without diminishing the available supply and without deterioration of quality.)

1938 Algal barrier reefs in the lower Ozarkian of New York: New York State Mus. Bull. 315, p. 31.
(Briefly mentions the high K^{41} (heavy potassium) concentration at Saratoga Springs.)

1942 One hundred and fourth annual report of the New York State Museum: New York State Mus. Bull. 330, p. 51, 65.
(As population increases the demand for water for private and industrial use will increase. Concentrations of industry and population cannot continue without diminishing the available supply and the deterioration of the quality of water.)

ALLEN, R. L.

1853 Historical, chemical, and therapeutical analysis of the principal mineral fountains at Saratoga Springs: 3d ed., revised, Saratoga Springs, B. Huling.
(Describes 11 springs in the vicinity of Saratoga Springs, and includes 10 chemical analyses. Also published in 1844, 1st ed.; 1848, 2d ed.)

1858 An analysis of the principal mineral fountains at Saratoga Springs: New York, Ross and Tousey, 113 p.
(Contains chemical analyses of six wells and springs in Saratoga County. The water was analyzed for sodium chloride, sodium carbonate, calcium carbonate, magnesium carbonate, sodium iodide, iron carbonate, silica, and alumina.)

1859 Handbook of Saratoga and strangers guide: New York, W. H. Arthur and Co.
(Discusses briefly 13 springs in and near Saratoga Springs. Included are analyses of seven springs.)

1866 Handbook of Saratoga and strangers guide: Albany, J. Munsell, 147 p.
(Discusses 13 springs in and near Saratoga Springs and lists chemical analyses for some of the larger springs.)

AMERICAN SOCIETY OF CIVIL ENGINEERS, COMMITTEE ON WATER SUPPLY ENGINEERING

1940 Important events, developments, and trends in water supply engineering during the decade ending with the year 1939: Am. Soc. Civil Engineers Trans., v. 105, art. 2096, 41 p.
(Brief reference is made to ground-water levels and salt content on Long Island. The "Lloyds Gravel" was identified as a water-bearing stratum next above bedrock beneath Long Island. Twelve items of progress during the decade were listed which included techniques of exploration, well construction, pumping equipment, organization, and publication of data.)

AMERICAN WATER WORKS ASSOCIATION

1958 Developments in artificial ground-water recharge: Am. Water Works Assoc. Jour., v. 50, pt. 2, p. 867.
(Artificial recharge in New York continues to be centered in Nassau and Suffolk Counties where over 800 storm-water recharge basins have been successfully developed. Test results show a range in seepage rates of 20 to 400 gpd/sq ft.)

ANDREALI, ALDO

(See Flynn, J. M., 1958)

ANDRES, B. D.

1960 Effect of synthetic detergents on the ground waters of Long Island, New York: New York State Water Pollution Control Board, research rept. no. 6, 18 p., 9 figs.
(Ground water is polluted by laundry and laundramat waste at Mastic, Farmingville, Deer Park, and other areas of Suffolk County. The effects reported by consumers are unpleasant taste, odor, and appearance, or a burning or stinging sensation. The pollution increases the total dissolved solids content by 50 to 150 ppm. The additional pollution caused by effluent from individual home owner's laundry machines is noted. The apparent willingness to abandon the shallow aquifer to pollution is questioned. Figures are presented showing the plan views at sites investigated, geologic sections, and depth to which observation wells were constructed. A table of the laundry survey presents basic data.)

ANONYMOUS

1949 What about the water table?: The Conservationist, State of New York, Dept. of Conservation, v. 4, no. 1, Aug.-Sept., p. 12-13.
(Briefly describes the occurrence of ground water in New York with emphasis on the water table and how it responds to recharge and discharge. Article contains a hydrograph of water levels in a well at Scotia from 1932 to 1949.
Article actually written by Theodore Arnow, U.S. Geol. Survey.)

1965 Ground waters added to Delaware Program: New York's waters, v. 20, no. 1, p. 6.
(Conservation of ground water by the Delaware River Basin Commission is stated as additional objective.)

1966 Scientists use isotope tracers to follow detergent-contaminated waste movements: New York's waters, v. 21, no. 3, p. 1 and 4.
(Discusses use of tracers in cesspool waste to determine pollution migration in shallow aquifer of Nassau and Suffolk Counties.)

1966 Ground-water classification hearings scheduled throughout New York State: New York's waters, v. 21, no. 4, p. 2.
(Discussion of plan to classify New York's ground waters into GA (potable source), GSA (saline water that may be converted), and Class GSB (extremely saline waters).)

1967 Statewide system is adopted to classify ground waters, New York: New York's waters, v. 22, no. 4, April 1967, p. 4.
(Divides State's ground waters into three categories: Class GA (drinking source), Class GSA (saline water that may be converted), and Class GSB (extremely saline waters).)

ARCHER, R. J.

(See LaSala, A. M., Jr., 1964)

ARNOW, THEODORE

(See also Perlmutter, N. M., 1953)

1949 The ground-water resources of Albany County, New York: New York Water Power and Control Comm. Bull. GW-20, 56 p., 2 pl., 6 figs.

(Glacial deposits are the major source of ground water. The yield of wells in bedrock is small compared to that of wells in glacial or alluvial deposits. Data for the 531-sq mi county include 286 well records, 17 spring records, 31 well logs, 30 chemical analyses, and a map of bedrock geology adapted from existing sources.)

1951a The ground-water resources of Fulton County, New York: New York Water Power and Control Comm. Bull. GW-24, 41 p., 2 pl., 9 figs.

(Glacial deposits are the best aquifers in the county. An area that may be a possible source of large ground-water supplies is in the vicinity of Gloversville, where a part of the buried preglacial valley of the Sacandaga River was outlined by resistivity and seismic surveys. Data for the 497-sq mi county include 219 well and spring records, 14 well logs, 22 chemical analyses, 2 geologic cross sections, graphs for resistivity surveys, a seismic time-distance graph, and a geologic map of the bedrock adapted from an existing source.)

1951b The ground-water resources of Columbia County, New York: New York Water Power and Control Comm. Bull. GW-25, 47 p., 3 pl., 4 figs.

(The ground-water supply is sufficient to meet more than the present demands. Alluvial deposits and glacial sand and gravel are the most productive aquifers. Lebanon Warm Spring yields water of deep-seated origin rising along a fault plane. All other ground water in the county has its source in precipitation on the immediate area. Data for the 638-sq mi county include 397 well and 19 spring records, 25 well logs, 24 chemical analyses, a geologic cross section, and a map of buried rock topography (scale about 1:34,000). Geologic maps of surficial deposits and bedrock are adapted from existing sources.)

ASSELSTINE, E. S.

(See also Lusczynski, N. J., 1956)

ASSELSTINE, E. S.

1946 Progress report on ground-water conditions in the Cortland quadrangle, New York: New York Water Power and Control Comm. Bull. GW-16, 49 p., 2 pl., 2 figs.
(Sufficient water for domestic needs can be obtained anywhere in the county from wells in bedrock. Larger supplies are available only from sand and gravel deposits in the valleys.
Data for the 200-sq mi area include 97 well records and 15 chemical analyses.)

1955 (and Grossman, I. G.) The ground-water resources of Westchester County, New York; Part 1, Records of wells and test holes: New York Water Power and Control Comm. Bull. GW-35, 79 p., 3 pl., 1 fig.
(Contains a brief description of the consolidated bedrock and unconsolidated surficial deposits which together are the source of all ground water in Westchester County. Data include logs of 96 wells, and borings and well records for more than 1,100 wells.)

BAFFA, J. J.

1967 (and Bartilucci, N. J.) Waste-water reclamation by ground-water recharge on Long Island: Water Pollution Control Federation Jour., v. 39, March 1967, p. 431-45.
(Discusses removal of solids from waste water for recharge of Long Island ground water to prevent salt-water intrusion. Use of anthracite as filter medium is discussed.)

BAILEY, W. T.

1886 Richfield Springs: Chicago, A. S. Barnes and Co., 106 p.
(Contains the analyses for 1 spring and 1 well at Richfield Springs.)

BARKER, F. B.

(See Scott, R. C., 1962)

BARKSDALE, H. C.

1955 (and Lang, S. M.) Ground water in the Delaware River valley: Am. Soc. Civil Engineers Proc., v. 81, separate 593, 8 p.
(Consolidated rocks of the upper Delaware River valley yield small to moderate ground-water supplies. The ground water in some of these rocks may be fairly hard and moderately high in dissolved solids. Coastal Plain formations yield moderate to large ground-water supplies. The largest ground-water yields are obtained where Coastal Plain aquifers crop out along the Delaware River. The waters are of good overall quality except where locally contaminated by industrial wastes.)

BARKSDALE, H. C.
1966 (O'Bryan, Deric, and Schneider, W. J.) Effect of drought on water resources in the Northeast: U.S. Geol. Survey Atlas HA-243.
(Maps showing status of ground-water levels for 1962-66; graphs showing ground-water levels and trends for this period.)

BARNELL, R. L.
1961 (and DeLuca, F. A.) Ground-water levels in Long Island, New York, 1958-59: U.S. Geol. Survey open-file report, 66 p., 6 figs.
(Contains water-level data for 162 wells located on Long Island, New York.)

BARNHART, E.
(See Eckenfelder, W. W., 1960)

BARTILUCCI, N. J.
(See Baffa, J. J., 1967)

BAUDISCH, OSKAR
(See Goldring, Winifred, 1937)

BAYLEY, W. S.
(See Darton, N. H., 1908)

BEAMER, N. H.
(See Lohr, E. W., 1953)

BECHERT, C. H.
1949 (and others) Current developments in ground-water law: Am. Water Works Assoc. Jour., v. 41, no. 11, p. 1002-1012.
(Recent legislation pertaining to artificial recharge of ground water for the States of Indiana, New Jersey, New York, and Ohio is described.)

BECK, L. C.
1826 Salt springs at Salina, Onondaga County, State of New York: New York, J. Seymour, 36 p.
(Describes the geology of the Onondaga Valley and the Salina Springs at the southeast end of Onondaga Lake. Contains chemical analyses of the brine and of the dried mineral concentrates.)

1838 Mineral springs of the State of New York: New York State Geol. Survey, 2d ann. rept., Assembly Doc. 200, v. 4, p. 8-109.
(Lists the counties which have mineral springs, and describes the chemical and physical characteristics of each, when known.)

BECK, L. C.

1840 Mineral springs of the State of New York: New York State Geol. Survey 4th ann. rept., Assembly Doc. 50.
(Lists the counties of New York in which mineral springs are known to exist. The springs are classified according to the minerals dissolved in the water. The minerals known in each county are mentioned briefly.)

1842 Mineralogy of New York: Albany, W. and A. White and J. Visscher, p. 99-167, 1 pl.
(Describes the types and origins of mineral springs in New York. There are six main types: brine, carburetted hydrogen, nitrogen, carbonated, sulphurous, and petrifying springs. Some of the outstanding springs in each group are discussed. Temperature measurements and chemical analysis of a few springs are given.)

BEETEM, W. A.

(See also Simpson, E. S., 1959)

1954 Chemical quality of water resources of the Conewango Creek basin: New York State Dept. of Commerce mimeo. rept., 58 p.
(Contains records of 39 wells and chemical analyses of water from each well.)

BERDAN, J. M.

1948 Hydrology of limestone terrane in Schoharie County, New York: Am. Geophys. Union Trans., v. 29, no. 2, p. 251-253, 3 figs.
(The effects of solution on Devonian and Upper Silurian carbonate rocks are well displayed in Schoharie County because the outcrop belt is relatively wide. A brief discussion of types of caverns is given.)

1950 The ground-water resources of Schoharie County, New York: New York Water Power and Control Comm. Bull. GW-22, 61 p., 2 pl., 4 figs.
(Moderately large supplies of ground water may be available from sand and gravel deposits in Catskill valley and the Manorkill and Jefferson areas. Cobleskill valley and most of Schoharie Creek valley contain extensive clay deposits laid down in glacial lakes, and it is unlikely that large supplies can be developed. Drilled wells in bedrock in the southern three-fourths of the county yield an average of 15 gpm.
Data for the 620-sq mi area include 332 well and spring records, 45 well logs, 34 chemical analyses, and a geologic map (scale about 1:125,000) adapted in part from existing sources.)

BERDAN, J. M.

1954 The ground-water resources of Greene County, New York: New York Water Power and Control Comm. Bull. GW-34, 62 p., 3 pl., 5 figs.

(The chief aquifer is the Catskill Formation which underlies the western five-sixths of the county. The average yield of wells drilled into it is 20 gpm, whereas yields of wells in the other bedrock formations average no more than 10 gpm. Sand and gravel are not widespread, but wells in them yield an average of 22 gpm.
Data for the 653-sq mi county include 315 well and 20 spring records, 45 well logs, and 49 chemical analyses. Maps show bedrock and surficial geology adapted from published sources.)

BERKEY, C. P.

1923 (and Sanborn, J. F.) Engineering geology of the Catskill water supply: Am. Soc. Civil Engineers Trans., v. 86, art. 1509, 91 p., 3 pl., 18 figs.

(The Catskill Aqueduct includes several pressure tunnels in bedrock. In the Rondout Pressure Tunnel the porous Binnewater Sandstone was penetrated in as short a distance as possible. Other water-bearing formations were penetrated at high angles to drain ground water away from the heading. Solution effects on bedding planes are pictured. Inflow of ground water from faults in the Binnewater Sandstone and High Falls Shale caused the longest delays in construction during the early stages of which the inflow was greatest. In the Wallkill Pressure Tunnel a hard quarzitic sandstone yielded about 500 gpm entering through joints with no great flows at any one point. At the Hudson River crossing a heavy flow of water from a joint in granite was successfully stopped by grouting. There was no indication this flow was connected with the Hudson River, and the tunnel as a whole was fairly dry. The quantity of water for the 3,000-ft tunnel did not exceed 110 gpm at any time after the inrush of stored ground water.
The water-bearing formations of Suffolk County, Long Island, such as the "Lloyd Sand" and the glacial deposits, are briefly discussed as they were considered as a potential source of additional water supplies for the city of New York.)

1945 A geological study of the Massena-Cornwall earthquake of September 5, 1944, and its bearing on the proposed St. Lawrence River project: U.S. Engineers Office, New York Dist., open-file report, 117 p., illus.

(Contains a brief discussion of the effect of the earthquake on water wells drawing from unconsolidated deposits. Many owners reported a decrease in the yield at their wells. Reconditioning failed to revive the yield of many wells and new wells had to be constructed. Berkey

BERKEY, C. P. (Cont'd.)
suggests that the decreases in yield were caused by a compaction of the aquifers during the earthquake. A well drawing from bedrock at Brasher Falls reportedly started flowing after the earthquake.)

BLANK, R. H.
(See Thompson, D. G., 1937)

BOWMAN, ISAIAH
(See Veatch, A. C., 1906b)

BRADLEY, W. H.
1938 (and Pepper, J. F.) Structure and gas possibilities of the Oriskany sandstone in Steuben, Yates, and parts of the adjacent counties, pt. 1 of Geologic structure and occurrence of gas in part of southwestern New York: U.S. Geol. Survey Bull. 899, 68 p., 4 pl.
(Briefly describes the occurrence of salt water in the Oriskany Sandstone (p. 46). Many of the records of wells in the quadrangle descriptions and in the well tables mention occurrence of salt water or fresh water (p. 46-65). Includes a geologic structure contour map.)

BRASHEARS, M. L., JR.
(See also de Laguna, Wallace, 1948)

(See also Leggette, R. M., 1938, 1944)

(See also Roberts, C. M., 1945, 1946)

1941 Ground-water temperature on Long Island, New York, as affected by recharge of warm water: Econ. Geology, v. 36, no. 8, p. 811-828, 2 figs., 4 tables.
(The water table in an area of 45 sq mi in western Long Island was below sea level in 1933. In order to prevent further overdevelopment the New York Water Power and Control Comm. has required ground water used for cooling purposes be returned to the ground. The return of warm water has raised ground-water temperatures as much as 20°F. A gradual rise in ground-water temperature has occurred in much of western Long Island.)

1946a Artificial recharge of ground water on Long Island, New York: Econ. Geology, v. 41, no. 5, p. 503-516.
(In 1933 the water table in a large area of western Long Island was below sea level and the quality was threatened by the inflow of salt water. To prevent overdevelopment the New York Water Power and Control Comm. required that water used for cooling purposes must be returned to the ground. Since that time there has been a rise in water levels in the critically overdeveloped areas.)

BRASHEARS, M. L., JR.

1946b Cooperative ground-water studies in the State of New York: New York State Dept. of Health Water Works News, v. 1, no. 4, 1 p.
(Briefly describes the method of investigating the ground-water resources of the State by the U.S. Geol. Survey in cooperation with the New York Water Power and Control Comm. Areal studies by county are in progress and water-level records are obtained at observation wells at selected points in the State.)

1949 Bibliography of geology and ground-water conditions on Long Island, in Suter, Russell, Mapping of geologic formations and aquifers of Long Island, New York: New York Water Power and Control Comm. Bull. GW-18, p. 207-212.
(Lists 69 references to the geology and ground-water resources of Long Island.)

1953 Recharging ground-water reservoirs with wells and basins: Mining Eng., v. 5, no. 10, p. 1029-1032.
(Describes the operation of recharge wells on Long Island. Since 1933 more than 300 recharge wells have been installed on Long Island. These are primarily to return cooling water to the ground. Excessive pumping had lowered the water table below sea level in a 40-sq mi area in Brooklyn.)

BRICE, H. D.

1956 (Whitaker, C. L., and Sawyer, R. M.) A progress report on the disposal of storm water at an experimental seepage basin near Mineola, New York: U.S. Geol. Survey duplicated rept., 34 p., 2 pl., 22 figs.
(The disposal of storm-water runoff by a system of storage and seepage basins in Nassau and Suffolk Counties, Long Island, is an effective means of water conservation. Rapid seepage normally occurs in the coarse sand and gravel which was deposited during Late Pleistocene glaciation. The report contains data on seepage rates under a variety of environmental conditions and controlled water levels.)

BROOKS, J. N.

1913 The infiltration of ground water into sewers: Am. Soc. Civil Engineers Trans., v. 76, art. 1276.
(Two of the factors governing the total quantity of infiltration into a sewer are: (1) the character of the materials traversed by the sewer, and (2) the relative positions of the sewer and the ground-water level. Infiltration rates of a sewer laid at Batavia declined from 32,260 gallons per mile to about 22,580 gallons per mile, after house connections, due to clogging of sewer pipe joints by silt or deposits of salts. Contains discussions which include remarks on quantities of infiltration.)

BROWN, J. S.

1925 A study of coastal ground water with special reference to Connecticut: U.S. Geol. Survey Water-Supply Paper 537.
(Discusses large-scale pumping of ground water on Long Island. Salt-water encroachment caused the abandonment of several deep wells near the south shore of Long Island.)

BROWN, R. H.

1946 (and Ferris, J. G.) Progress report on ground-water resources of the southwestern part of Broome County, New York: New York Water Power and Control Comm. Bull. GW-15, 48 p., 3 pl., 11 figs.
(The area includes the "Triple Cities" of Binghamton, Johnson City, and Endicott.
Data for the 200-sq mi area include 58 well records, 30 logs of borings, 33 chemical analyses, pumpage figures for an 8-year period, results for an aquifer test of sand and gravel at Fenton, and an estimate of water entering and leaving the area.)

1947 Geophysical explorations of ground-water resources: New York State Dept. of Health Water Works News, v. 2, no. 3, 1 p.
(Briefly describes methods used, the costs, and the feasibility to explore ground-water resources in valleys near Binghamton, Cambridge, and Salem, by geophysical methods.)

BRUSH, W. W.

1936 The ground-water supply of Long Island and its future: Water and Sewage Works, v. 83, Feb.
(In recent years salt-water encroachment has become a very important problem. Reports of engineers making studies of the Long Island situation have shown a lowering of the static water table at the rate of 15 inches per year. This was a prime reason for the Water Power and Control Comm. to deny New York City the right to construct large-capacity wells on Long Island.)

BRYSON, JOHN

1888a Notes on a well on the south side of Long Island: Am. Geologist, v. 2, p. 136-137.
(Reports on a well at Woodhaven about 1 mile from Jamaica Bay. The well is 475 ft deep and reportedly did not penetrate marine sediments which the author believes proves the south shore of Long Island is of glacial origin.)

1888b Artesian well, Woodhaven, Long Island: Am. Geologist, v. 3, p. 124.
(Contains a log of a well 556 ft deep at Woodhaven, Long Island. The well enters bedrock at 540 ft. Because of a lack of fossil evidence, the postglacial and preglacial beds could not be differentiated.)

BUDDINGTON, A. F.

1941 (and Whitcomb, Lawrence) Geology of the Willsboro quadrangle, New York: New York State Mus. Bull. 325, p. 127-128.
(Describes the difficulties experienced by water companies in northern New York.)

BULIN, G. W., JR.

(See Gentry, J. T., 1959)

BURR, W. H.

1903 (Hering, R., and Freeman, J. R.) Report of the Commission on Additional Water Supply for the city of New York: New York, M. B. Brown Co., 980 p.
(Contains data on New York City water sources such as availability, quality, and methods of purification. Discusses the probable quality and quantity of additional water supplies adjacent to existing systems with emphasis on the pollution of existing supplies.)

BURWELL, J. H.

1944 Schenectady, N.Y., meets water supply crisis: Am. City, Nov.
(Describes the development of Schenectady's water supply. In 1895 a large, dug well was completed, and in 1903 two more large-diameter dug wells were completed. In 1940 a series of wells were drilled to alleviate a water shortage brought about by the increase in industrial use. Finally in 1943 nine wells, 70 ft deep, were drilled. These would yield 3,500 gpm.)

BUTTS, CHARLES

1910 Geologic atlas of the United States; Warren folio, Pennsylvania-New York: U.S. Geol. Survey Geol. Atlas, Folio 172, 12 p., 3 pl., 16 figs.
(Contains a brief section on underground water. Construction of oil wells indicates that bedrock in the area contains water to depths as great as 600 ft, as indicated by the depths to which oil wells are cased.)

CAMPENNI, L. G.

1961 Synthetic detergents in ground waters, Part 1: Water and Sewage Works, May, 4 p.
(Briefly reviews the nature of the contamination and the situation on Long Island specifically.)

CANNON, H. L.

1955 Geochemical relations of zinc-bearing peat to the Lockport Dolomite, Orleans County, New York: U.S. Geol. Survey Bull. 1000-D.
(Samples from 30 wells were analyzed for zinc. The results of the study show that the zinc content of the ground water depends upon the types of rocks through which the water

CANNON, H. L. (Cont'd.)
moves. The wells that bottom in the Lockport Dolomite contain more zinc than those that bottom in the Rochester Shale. Shallow wells that bottom in till contain very little zinc.)

CARLSON, J. H.
1966 Experimental injection well: Water Well Jour., v. 20, no. 5, p. 52.
(Describes recharge project in Bay Park, Long Island.)

CHANDLER, C. F.
1871 Lecture on water: Albany, The Argus Co., 49 p.
(A lecture on the quality of water in different parts of the world. Contains chemical analyses for mineral springs in New York. Also contains analyses of total dissolved solids for 24 public supplies in New York. Briefly mentions the desirable qualities of water necessary for domestic and industrial use.)

CLAPP, F. G.
(See Fuller, M. L., 1906a)

CLARKE, F. W.
1893 Report of work done in the division of chemistry during the fiscal years 1891-92 and 1892-93: U.S. Geol. Survey Bull. 113, p. 113.
(Contains the analysis for one spring at Caledonia, New York.)

1908 The data of geochemistry: U.S. Geol. Survey Bull. 330.
(Contains an analysis for a spring in Livingston County.)

1911 The data of geochemistry: 2d ed., U.S. Geol. Survey Bull. 491.
(Contains chemical analyses for mineral springs and wells in New York.)

1914a Tenth report of the director of the state museum and science department: New York State Mus. Bull. 173, p. 36-37.
(Briefly describes the mineral springs and wells in Saratoga County with emphasis on bedrock structure as an explanation for the origin of the mineral springs.)

1914b Water analyses from the laboratory of the United States Geological Survey: U.S. Geol. Survey Water-Supply Paper 364, p. 8-9.
(Contains an analysis for Caledonia Spring.)

1915 The data of geochemistry: 3d ed., U.S. Geol. Survey Bull. 616.
(Contains chemical analyses of spring water, well water, and oil well brines of New York State.)

CLARKE, F. W.

1924 The data of geochemistry: 5th ed., U.S. Geol. Survey Bull. 770, 841 p.
(Earlier editions were published as Bulls. 330, 491, 616 and 695. Gives estimates of the total quantity of underground water in the earth's crust (p. 35). Contains a discussion of the statement and interpretation of water analyses (p. 64-68) and a short discussion of springs (p. 68-69). Contains a chapter on mineral wells and springs (p. 181-217), the definition and classification of mineral waters (including typical analyses), changes in composition of water and reactions with adjacent material, chemical deposits from water, vadose and juvenile waters, and the relation of thermal springs to volcanism.
Contains several analyses of water from New York which are used as examples of different types of waters. Included are analyses of brines from Syracuse and mineral waters from Saratoga.)

COATES, D. R.

1966 Base-flow characteristics of streams in the glaciated Appalachian Plateau: presented at 47th Ann. Mtg. of the Am. Geophys. Union, April 19-22, 1966; (Abstracted in Am. Geophys. Union, Trans., v. 66, no. 1, March 1966, p. 87).
(Geohydrology of 25 drainage basins (14 to 282 square miles) in Southern N. Y. and Northern Pa. is discussed. Ten different low-flow indices developed and compared with 30 geologic, geomorphic, or hydrologic variables. Correlations in Eastern basin (Delaware) are with precipitation and annual discharge. In western area (Susquehanna) valley-fill and streamflow direction are most important. Effect of glaciation discussed.)

COBB, E. B.

1965 Development of the Monroe County Water Authority and its $17,000,000 improvement program: Jour. of the New England Water Works, v. 79, no. 2 (June), p. 176-218.
(Page 191-193 discusses possibility of developing ground-water source as supply and why this possibility was rejected.)

COHEN, PHILIP

(See also Heath, R. C., 1966)

1966 (and Durfor, C. N.) Design and construction of a unique injection well on Long Island, New York: U.S. Geol. Survey Prof. Paper 550-D, p. D253-D257.
(Describes construction of an injection well on Long Island; also describes physical and chemical properties of materials used.)

COLLINS, W. D.

1924 Temperature of water available for industrial use in the United States; in Contributions to the Hydrology of the United States: U.S. Geol. Survey Water-Supply Paper 520-F, p. 97-104.

(The report contains a generalized map that shows the temperature of water from non-thermal wells at depths of 30 to 60 ft to be from 42° to 47°F in northern New York State, 47° to 52°F in southern New York State, and 52° to 54°F in Long Island. The change of temperature vertically is briefly described.)

COLONY, R. J.

1930 Report to the Saratoga Springs Commission on a study of the geology of the Saratoga area and the problem of the mineral waters: New York State Legislative Doc. 70, v. 18, p. 77-216.

(Discusses the geologic history of the Saratoga Springs area and the origin of the mineral water. Contains chemical analyses for 19 wells.)

CONKLING, HAROLD

1937 Administrative control of underground water, physical and legal aspects: Am. Soc. Civil Engineers Trans., v. 102, art. 1971, 1 p.

(The natural recharge of alluvium and till on Long Island is briefly described. The small draft on the underground water resources of western Long Island is noted. The effects of exploitation of the fresh-water resources are predicted with respect to: (1) decrease in amount of water moving toward the ocean, (2) reduction in pressure head, and (3) decrease of stream discharge, and movement of salt water from the ocean under the land.
Also published in Am. Soc. Civil Engineers Proc., 1936, v. 62, no. 4, pt. 1.

CONRAD, T. A.

1837 Mineral springs of the State of New York: New York State Geol. Survey 1st Ann. Rept., Assembly Doc. 161, v. 2, p. 172-176.

(Briefly mentions salt springs in Onondaga County. Describes a brine well in the town of Montezuma.)

COOK, J. H.

1908 Limestone caverns of eastern New York: New York State Mus. 60th Ann. Rept., p. 32-51.

(Contains results of a preliminary survey of the limestone caverns of Schoharie and Albany Counties. Data include a brief description of the physical features of the accessible caves (including compass direction of the principal openings), notes on direction of flow of streams, plan and profile sections of some of the larger

COOK, J. H. (Cont'd.)

caves (including Howe's Cave and Ball's Cave), and photographs. Cook found that the caves appear to be restricted to three distinct levels coinciding with the Onondaga, Becraft, and the Coeymans-Cobleskill Formations. The latter he named the Manlius Zone because most of the caverns in the Coeymans-Cobleskill section are in the Manlius Limestone. Cook includes a brief discussion of cave formation as it relates to the geology of the area.)

COX, C. R.

1952 Water supply control: New York State Dept. of Health, Bur. of Environmental Sanitation, Bull. No. 22.
(Contains data on methods of constructing wells and ways to prevent surface contamination.)

CRAIN, L. J.

(See also Winslow, J. D., 1965)

1965 Ground-water resources of the Jamestown area, New York: New York Water Resources Comm. Bull. GW-58, 238 p., 4 pl., 44 figs., 7 tables.
(The water resources of the Jamestown area are described with emphasis on the Jamestown aquifer. This aquifer is a sand and gravel unit overlain by lake clays and silts with hydraulic connection to coarse-grained deltas which were deposited from tributary valleys when the major valley was occupied by a lake.
Contains detailed analysis of potential yield of the aquifer. Included are over 750 well records, 110 chemical analyses, 250 well logs, and the results of 5 pumping tests.)

CRANDELL, H. C.

(See also Perlmutter, N. M., 1959)

1962 Geology and ground-water resources of Plum Island, Suffolk County, N.Y.; in Contributions to the Hydrology of the United States: U.S. Geol. Survey Water-Supply Paper 1539-X, 35 p., 4 pl., 7 figs.
(A shallow, fresh-water lens contained in Pleistocene deposits constitutes the island's ground-water supply. This reservoir yielded 31 million gallons in 1958. Slight salt-water contamination at one well field occurred in 1954 and 1955. Recommendations are made to control and alleviate the contamination.)

CRANDELL, H. C.

1963 Geology and ground-water resources of the Town of Southold, Suffolk County, New York: U.S. Geol. Survey Water-Supply Paper 1619-GG, 36 p., 3 pl., 6 figs., 5 tables.

(This report describes the geology and ground-water conditions in the Southold area with emphasis on salt-water intrusion into the water-table aquifer in stratified drift of Pleistocene age. Measures designed to evaluate and control salt-water intrusion during periods of low precipitation are recommended.)

CRIPPEN, J. R.

(See Mack, F. K., 1964)

CROSBY, W. O.

(See Veatch, A. C., 1906b)

CULLINGS, E. S.

1936 Fluctuations in ground water at Woodgate, New York: Am. Geophys. Union Trans., v. 17, pt. 2, p. 357.

(Discusses ground-water fluctuations in northwestern New York with an attempt at correlating seasonal variations with plant consumption of ground water. Contains precipitation and water-level data for the period 1926-36.)

CUMING, DONALD

(See Peters, J. H., 1967)

CURTIS, N. J.

1958 Mechanics of water conservation: New York State Conservationist, v. 12, no. 5, 3 p.

(A soil profile found in Schoharie County beneath a stand of maple, birch, and beech averaging 150 years in age contained up to 1 ft of humus at the base. The humus acted as a large, water-storage layer. Profile in cultivated soil shows replacement of humus zone and water-storage layer by "plowed zone." The loss of humus reduces water-storage capacity with consequent reduction of water seepage into wells and springs. Adequate layers of humus prevent rapid runoff or quick penetration of rainfall to water table, thereby moderating heavy streamflow in the spring and reducing flash-flood damage.

CUSHING, H. P.

1910 (and Fairchild, H. L., Ruedemann, R., and Smyth, C. H., Jr.) Geology of the Thousand Islands region: New York State Mus. Bull. 145, p. 133-136.

(Underground drainage in this area is chiefly in the Leray Limestone area. The underground channels in limestone cannot absorb the entire flow during the spring floods, and river beds are thoroughly washed out.)

CUSHING, H. P.

1914 (and Ruedemann Rudolf) Geology of Saratoga Springs and vicinity: New York State Mus. Bull. 169, 177 p., 20 pl., 17 figs., geol. map and secs.

(Briefly discusses the occurrence of mineral waters in the vicinity of Saratoga Springs, the geologic factors that controlled the formation of the springs, and theories on the origin of the waters. The mineral water occurs in the Little Falls Dolomite and overlying beds hydraulically connected to the Little Falls. The water is confined east of the Saratoga fault by shales of Ordovician age (including the Canajoharie, Normanskill, and Snake Hill). The mineral waters are believed to originate to the east, possibly in the mountainous area east of the Hudson River. The composition of the mineral waters is characterized by a high content of chlorides and bicarbonates of sodium, calcium, and magnesium, high content of free carbon dioxide, and extremely low content of sulfates. Ruedemann suggests that the carbon dioxide may be derived from the metamorphism of impure limestones and calcareous shales. The authors believe that the low sulfate content may result from the precipitation of sulfates in the presence of carbonic acid. The presence of hydrogen sulfide in water derived from the shales of the area is briefly mentioned.)

CUSHMAN, R. V.

1950 The ground-water resources of Rensselaer County, New York: New York Water Power and Control Comm. Bull. GW-21, 56 p., 3 pl., 4 figs.

(Stratified drift and related sand and gravel of fluvial origin are the best aquifers in the county. Bedrock yields small supplies of water generally sufficient only for domestic and farm needs.

Data for the 651-sq mi area include 350 well and 17 spring records, 22 well logs, 65 chemical analyses, a geologic cross section, and a geologic map adapted from existing sources.)

1953 The ground-water resources of Washington County, New York: New York Water Power and Control Comm. Bull. GW-33, 65 p., 3 pl., 10 figs.

(Beds of coarse sand and gravel in outwash and delta deposits are the most productive water-bearing beds in the county. Bedrock is locally a poor source of water but is commonly well jointed, permitting small supplies to be obtained. The average yield of wells in sand and gravel is about 10 times the average of wells in bedrock. Mineralized water is found in wells near normal faults. A resistivity survey was used to delineate buried valleys.

Data for the 837-sq mi area include more than 500 well and spring records, 29 well logs, 39 chemical analyses, physical properties of sediments, and geologic maps of bedrock and surficial deposits adapted from existing sources.)

DALE, N. C.

1953 Geology and mineral resources of the Oriskany quadrangle: New York State Mus. Bull. 345, 197 p., 1 pl., 38 figs.
(Contains a brief discussion of the occurrence of ground water in the area.)

DALE, T. N.

1905 Water resources of the Fort Ticonderoga quadrangle, Vermont and New York, in Fuller, M. L., Contributions to the hydrology of eastern United States, 1904: U.S. Geol. Survey Water-Supply Paper 110, p. 126-129.
(Most of the discussion is related to Vermont. Points out that some wells and springs yield water in the summer only a few degrees above freezing.)

DARTON, N. H.

(See also Merrill, F. J. H., 1902)

1896 Artesian-well prospects in the Atlantic Coastal Plain region: U.S. Geol. Survey Bull. 138, 232 p., 19 pl.
(Describes briefly the geologic structure and the ground-water conditions on Long Island, Staten Island, and New York City. Information on location, depth, diameter, yield, and position of the water level with respect to the land surface for selected wells on Long Island and in New York City is contained in tables.)

1902 Preliminary list of deep borings in the United States, Part II, Nebraska-Wyoming: U.S. Geol. Survey Water-Supply Paper 61, 67 p.
(Contains tabular data on wells and other borings more than 400 ft deep. Information includes depths, diameters, and yields of the wells; the head, temperature, and quality of the water; and purposes for which the boring was done. Data for New York listed on pages 15-19.)

1905 Deep borings in the United States: U.S. Geol. Survey Water-Supply Paper 149, p. 87-93.
(Lists the deep wells which were drilled in New York and gives the depth, diameter, yield, and water level for each.)

1908 (and Bayley, W. S., Salisbury, R. D., and Kummel, H. B.) Geologic atlas of the United States; Passaic folio, New Jersey-New York: U.S. Geol. Survey Geol. Atlas, Folio 157, 28 p., 4 pl., 32 figs.
(Contains brief discussions of the water-bearing formations and representative wells on Staten Island, Hoffman Island, Governor's Island, and the western tip of Long Island.)

DAUBENY, CHARLES

1839 Notice of the thermal springs of North America: Am. Jour. Sci., v. 36, p. 88-93.
(Briefly mentions the springs at Lebanon, Ballston, and Saratoga Springs, New York. Gives temperature range for the springs visited in each area.)

DAVIDS, H. W.

1951 (and Lieber, Maxim) Underground water contamination by chromium wastes: Water and Sewage Works, v. 98, no. 12.
(Chromium contamination in Nassau County was first reported in 1942. One family in Nassau County was drinking water with 25 ppm hexavalent chromium as recently as 1951 without any deleterious effects. The quality of ground water in the contaminated area should continue to improve, since pollution has stopped.)

DAVIS, J. V.

1916 The Astoria Tunnel under the East River for gas distribution in New York City: Am. Soc. Civil Engineers Trans., v. 80, 96 p., 3 pl., 21 figs., with discussions.
(A zone of highly decomposed dolomite yielding a large flow of water from numerous fissures was penetrated by the Astoria Tunnel 186 ft below mean sea level along a distance of 354 ft. Individual fissures yielded 300 to 10,000 gallons of water per minute under a head of 95 lbs. A direct connection to the East River bed was proved. Seams in the dolomite up to 6 ft in width were found filled with micaeous greensand that prevented flow of any water.)

DE LAGUNA, WALLACE

(See also Suter, Russell, 1949)

1948 (and Brashears, M. L., Jr.) Configuration of the rock floor of western Long Island: New York Water Power and Control Comm. Bull. GW-13, 32 p., 1 pl., 1 table.
(As few wells are drilled into the bedrock on Long Island the depth to bedrock commonly indicates the maximum depth to which wells are drilled. At the northwest end of the island bedrock is at the surface. At the south shore of Long Island it is 1,500 ft below sea level.)

1948 Geologic correlation of logs of wells in Kings County, New York: New York Water Power and Control Comm. Bull. GW-17, 35 p., 3 pl.
(Two geologic cross sections are based on the interpretation of about 400 logs of water wells in Brooklyn. Maps show locations of wells and formations penetrated.)

1963 Geology of Brookhaven National Laboratory and vicinity, Suffolk County, New York: U.S. Geol. Survey Bull. 1156-A, 35 p., 2 illus., 3 figs., 1 table.

DE LAGUNA, WALLACE (Cont'd.)

(The report describes in detail the six principal stratigraphic units lying on the Precambrian (?) Early Paleozoic basement rock. Included in the discussion are the water-bearing characteristics of these units, which are divided on the basis of such into three principal aquifers.)

1964 Chemical quality of water, Brookhaven National Laboratory and vicinity, Suffolk County, New York: U.S. Geol. Survey Bull. 1156-D, 73 p., 1 illus., 19 figs., 6 tables.

(This report tabulates and interprets 300 chemical analyses of water samples from wells, lakes, and rivers in the area. Higher concentrations of radioactivity in surface waters is evaluated as an effect of recent Nevada bomb tests. Widespread contamination of ground water was noted as a result of leaching of nitrates from fertilizers in farmed areas, and local contamination from cesspools was experienced.)

DeLUCA, F. A.

(See also Barnell, R. L., 1961)

(See also Perlmutter, N. M., 1963b)

1965 (and Hoffman, J. F., and Lubke, E. R.) Chloride concentration and temperature of the waters of Nassau County, Long Island, New York: New York Water Resources Comm. Bull. 55.

(Presents a summary of basic data of chloride and temperature measurements; a well-location map is included.)

DE VARONA, I. M.

1902 Proposed further development of underground water supply for Brooklyn, New York: Eng. News, v. 48, Oct.

(Describes a plan to collect water by running a series of lateral or radiating collecting pipes from a central, shallow, collecting basin.)

DE ZUANE, JOHN

(See Romer, Harold, 1965)

DIEBOLD, C. N.

(See Spaeth, J. N., 1938)

DIGMAN, R. E.

(See Mack, F. K., 1962)

DISBROW, LEVI

1827 Notice on some recent experiments in boring for fresh water: Am. Jour. Sci., v. 12, p. 136-144.

(Discusses early attempts at drilling water wells in New York and New Jersey. Infers fresh water can be found anywhere as there are no reported failures.)

DOBSON, M. C.

1957 Water, Nassau County's treasure: New York State Conservationist, Apr.-May, p. 30-31.

(Western Long Island depends entirely on the annual rainfall to replenish its ground-water supply. Recharge basins which divert potential runoff water and channel it into the ground have maintained water levels in spite of a 300 percent increase in water use. Average rates for recharge wells are 23 gpd/sq ft of slotted casing.)

DODGE, R. E.

(See Merrill, F. J. H., 1902)

DOLE, R. B.

1916 Mineral waters in 1915: U.S. Geol. Survey Mineral Resources of U.S., 1915, pt. 2, p. 307-344.

(Tabulates mineral water sold in New York from 1911 to 1915 and lists 75 commercial springs. Production in 1915 amounted to 8,411,616 gallons and sold for an average price of $.08/gal.)

DOLLEN, B. H.

(See also Leggette, R. M., 1935)

1940 Water resources of the Clyde and Sodus Bay quadrangles in Gillette, Tracy, Geology of the Clyde and Sodus Bay quadrangles: New York State Mus. Bull. 320, p. 159-169.

(Briefly discusses the occurrence of ground water and the development of water supplies. Chemical analyses include 17 partial analyses from the State Dept. of Health and several other analyses from various sources.)

DURFOR, C. N.,

(See Cohen, Philip, 1966)

EATON, AMOS

1823 On the probable origin of certain salt springs: Am. Jour. Sci., v. 6, p. 242-243.

(Discusses the fact that whereas common salt is not apparent in rocks near salt springs, salty water may be derived from salt in the matrix of the country rock which is dissolved by percolating waters. This water may appear as saline spring water.)

ECKENFELDER, W. W.

1960 (and Barnhart, E.) Removal of synthetic detergents from laundry and laundramat wastes: New York State Water Pollution Control Board, research rept. no. 5, 47 p., 9 figs.

(Under a project sponsored by the Water Pollution Control Board detergent concentrations in ground water were determined by the methylene blue test. Measurements by this test of concentrations of less than 5 ppm are subject

ECKENFELDER, W. W. (Cont'd.)
to error. Laundramat effluent at Hicksville, Long Island, was found to contain a detergent concentration of between 50 and 90 ppm as A.B.S. The effluent can be treated by addition of carbon and alum and allowing the mixture to settle.)

EDDY, J. E.
(See Trainer, F. W., 1964)

ELLIS, A. J.
(See also Gregory, H. E., 1916)

1916 Ground water in the Waterbury area, Connecticut: U.S. Geol. Survey Water-Supply Paper 397, 73 p., 4 pl.
(Discusses the water in glacial drift and crystalline rocks, ground water for private and municipal uses, and methods of developing ground-water supplies. Describes one of the "well gauges" used by the borough of Brooklyn for water supply.)

ELLISON, L. A.
1946 The mineral spring: Staten Island Inst. of Arts and Sci., v. 10, p. 61-64.
(Describes a mineral spring at New Springville. Contains three chemical analyses for this and other springs on Staten Island.)

1949 Preliminary investigation of Staten Island natural waters, ponds, springs, lakes and wells: Staten Island Inst. of Arts and Sci., v. 11, Apr., p. 85-91.
(Contains chemical analyses for seven springs and wells in Richmond County.)

EMERY, F. E.
1889 Notes on fluctuations in height of water in an unused well: New York Agr. Expt. Sta., 8th Ann. Rept., p. 374-377.
(Briefly notes the water-table fluctuations of a well at Geneva, New York, during the years 1886 to 1889. It also shows the monthly precipitation for the same period. The data seem to indicate there is a 4-month lag between the time of maximum precipitation and its recharging effect on water levels. There is no information on the well as to depth or length of casing.)

EMMONS, EBENEZER
1837 Springs of Chateaugay: New York State Geol. Survey, 1st Ann. Rept., Assembly Doc. 161, v. 2, p. 122.
(Briefly mentions the mineral springs of Chateaugay. They are intermittent springs which flow between April and September. They are very cold and emit bubbles of nitrogen.)

EMMONS, EBENEZER

1849 The Empire Spring: Albany, C. Van Benthuysen, 36 p.
(Describes the geology of central New York and emphasizes the fact that throughout the region sulfur and salt springs are quite numerous. The mineral springs of Saratoga Springs appear to be associated with igneous rocks but do not issue from them. Instead they have their origin in some of the old sedimentary rocks. The report contains five chemical analyses.)

ENGINEERING NEWS-RECORD

1956 Solution to a wet foundation problem: Eng. News-Record, v. 156, no. 15, p. 39-42.
(Describes the removal of ground water from foundation excavations in Kings County without dewatering the entire area. This was done by pumping water out of the plot in question and returning it to the ground adjacent to structures on both sides. Removal of water from beneath the adjacent buildings would have decreased the support or buoyancy of their foundations and caused them to settle or crack.)

FAIRCHILD, H. L. (See also Cushing, H. P., 1910)

1930 Artesian water in the Genesee Valley: Rochester Eng. Soc., v. 8, p. 236-243.
(Discusses the geologic history of western New York with reference to the buried river valleys. Describes one artesian well near Dansville which had a pressure of 75 lbs/sq in. Cities which are located near or over buried valleys are in a position to expand their public water supplies by constructing wells which would penetrate the coarse sand and gravel at the base.)

1935 Genesee Valley, hydrography and drainage: Rochester Acad. Sci., v. 7.
(Briefly reviews the geologic history of the area and describes the kind and amount of valley filling that was thought to have taken place. Contains a short statement on the quality of the artesian water and of its present utilization.)

FARLEY, J. M.

1902 A history of the White Plains water system: Am. Water Works Assoc. Proc., v. 22, 18 p.
(The report briefly describes the three original large-diameter, shallow, dug wells used at White Plains. Water from the wells contained a maximum of 12.2 grains total solids and 0.8 grains chlorine. Organic content indicated the water was safe for drinking. The depth to bedrock ranged from about 30 ft to about 90 ft below land surface. The maximum yield of the wells was reported to be 760,000 gpd.)

FARMER, A. S.
1909 The sources of and the methods of developing Long Island water supplies: Eng.-Contracting, v. 31, no. 22, p. 447-452, 15 figs.
(Discusses the geologic and hydrologic features of the Pleistocene and Cretaceous aquifers on Long Island. Contains well logs and cross sections showing the water table in different areas of Long Island.)

FERRIS, J. G.
(See also Brown, R. H., 1946)

1949 Ground waters, in Hydrology, by Wisler, C. O., and Brater, E. F.: New York, John Wiley and Sons, Inc., 419 p.
(Contains a hydrograph showing fluctuations of water level in a 386-ft well at Long Beach, N.Y., as compared to the tide at East Rockaway Inlet, N.Y.)

FETH, J. H.
1965 (and others) Preliminary map of the conterminous United States showing depth to and quality of shallowest ground water containing more than 100 parts per million dissolved solids: U.S. Geol. Survey Atlas HA-199.
(Shows areas including New York State which have greater than 1,000 ppm dissolved solids; 2 maps, 1 set of tables.)

FIEDLER, A. G.
(See also Thompson, D. G., 1938)

1957 Importance of ground water in the national economy: Am. Soc. Civil Engineers Trans., v. 123, no. 2938, 16 p.
(Typical ground-water problems in the U.S. are discussed by reference to six areas, including Long Island. The sandy permeable drift of Long Island receives recharge from precipitation at a rate of about 1,000,000 gpd/sq mi. Beneath the drift are Coastal Plain strata that form productive aquifers which, however, do not have their own source of recharge and, therefore, do not actually add to the ground-water potential. Maximum development of the ground-water resources of the Island will require perpetual vigilance because the Island is surrounded by salt water that will move inland when heads are lowered due to ground-water pumping.)

FISH, C. F.
1887 The mineral springs of Saratoga: Popular Sci. Monthly, v. 19, p. 24-33.
(Discusses the geologic features of the springs at Saratoga Springs and their origin. Contains analyses for 22 of the springs.)

FLYNN, J. M.

1958 (and Andreali, Aldo, and Guerrera, A. A.) Study of synthetic detergents in ground water: Am. Water Works Assoc. Jour., v. 50, no. 12, p. 1551-1562, 5 tables.
(The water supplies of 186 homes were sampled by the Suffolk County Dept. of Health. The study began in 1955 when complaints about a yellow color in the water were received. Subsequent analyses showed hexavalent chromium from plating plant wastes in the water. At this time complaints about frothy water were also made. After the study of synthetic detergents in ground water was made, these conclusions were reached. When wells and septic tanks are placed on small plots, synthetic detergents will appear. With the continued addition of synthetic detergents to ground-water reservoirs, the problem becomes more acute.)

1961 Impact of suburban growth on ground water in Suffolk County, New York: Ground-Water Contamination, Proc. of 1961 Symposium, The Robert A. Taft Sanitary Eng. Center Tech. Rept. W61-5, p. 71-82, 6 tables.
(This report discusses the pollution of the ground water in the glacial deposits of Suffolk County with emphasis on detergent contaminants.)

1965 Water resources - growing pains: Water and Sewage Works, v. 112, reference no. R-5.
(Waste water contamination of ground-water supplies in Suffolk County, N. Y., cited as impetus for implementing sewer systems and abandoning ground-water disposal systems. ABS major contaminant; "Drought" defined as low supply of good quality water.)

FONDA, S. F.

1854 Sharon Springs: New York, John J. Schroeder.
(Contains the chemical analyses for two springs in Schoharie County.)

1884 Sharon Springs: Albany, Weed, Parsons and Co.
(Contains the chemical analyses for three springs in Schoharie County.)

FOXWORTHY, B. L.

(See also Heath, R. C., 1966)

1966 Long Island, N. Y. - A challenge to man's water-management skills in The fresh water of New York State, its conservation and use: Proc. of a Symposium held at the State Univ. of New York at Buffalo, June 13-17, 1966, p. 216-221.
(Discussed Long Island ground-water development problems with reference to aquifer withdrawal, recharge, overdraft of storage, and salt-water intrusion; 1 map, 2 cross sections.)

FRAUENTHAL, H. L.

(See Lieber, Maxim, 1964)

(See Perlmutter, N. M., 1963c, 1964)

FREEMAN, J. R.

(See Burr, W. H., 1903)

FULLER, M. L.

1905a Bibliographic review and index of papers relating to underground waters published by the United States Geological Survey, 1879-1904: U.S. Geol. Survey Water-Supply Paper 120, 128 p.

(Lists all papers that contain information on ground water. Gives brief abstracts of these papers in regard to ground water with page references for papers dealing mainly with other subjects. Contains an index of the papers listed insofar as they relate to ground water.)

1905b Two unusual types of artesian flow, in Contributions to the hydrology of eastern United States, 1905: U.S. Geol. Survey Water-Supply Paper 145, p. 40-45, 4 figs.

(Describes the apparent phenomena of flowing wells penetrating a permeable aquifer along the north shore of Long Island, not overlain by a confining bed. Cause of the flow is attributed to differences in permeability of the various layers comprising the deposit.)

1905c (and Lines, E. F., and Veatch, A. C.) Record of deep-well drilling for 1904: U.S. Geol. Survey Bull. 264, p. 58-59, p. 91.

(Contains records of deep wells drilled in New York. Information includes depths, diameters, yields and purposes for which the wells were drilled.)

1905d Geology of Fishers Island, New York: Geol. Soc. Am. Bull., v. 16, p. 367-390.

(A well on Fishers Island entered granite at 281 ft and reported finding fresh water at 328 ft. It is assumed the overlying clay prevented both the escape of fresh water and the intrusion of salt water.)

1906a (and Clapp, F. G., and Johnson, B. L.) Bibliographic review and index of underground-water literature published in the United States in 1905: U.S. Geol. Survey Water-Supply Paper 163, 130 p.

(Lists practically all papers that contain any information on ground water; includes brief abstracts with respect to ground water, giving page references for reports dealing mainly with other subjects; contains index with respect to ground-water subjects of papers listed.)

FULLER, M. L.

1906b (and Sanford, Samuel) Record of deep-well drilling for 1905: U.S. Geol. Survey Bull. 298, 299 p.
(Gives an account of progress in the collection of well records and samples. Contains tabulated records of wells in 48 states and territories. Records of wells in New York are listed on pages 120-125. Logs of two wells, one near Getzville, Erie County, and the other near Saratoga Springs are listed on pages 244-245.)

1908 Artesian waters of the Atlantic Coastal Plain: Am. Water Works Assoc. Proc., v. 28, 30 p., 5 figs.
(Contains brief reference to areas along coastal lowlands of Long Island where flowing wells are located. Pleistocene, Tertiary, and Cretaceous water-yielding formations are listed.)

1914 The geology of Long Island: U.S. Geol. Survey Prof. Paper 82, 231 p., 205 figs.
(Describes the geological features of Long Island and the sequence of deposition of the Cretaceous, Tertiary and Pleistocene deposits. Contains well tables describing the location, water-bearing formation, and thickness of the deposits.)

GATES, J. W.

(See Slater, F. J., 1932)

GENTRY, J. T.

1959 (and Parkhurst, E., and Bulin, G. W., Jr.) An epidemiological study of congenital malformations in New York State: Am. Jour. Public Health, v. 49, no. 4, 22 p., 5 figs.
(The study suggests that the malformations are related to natural radioactivity in the environment. The highest rates of malformations are found in those areas underlain by igneous rocks and black shales and in which ground water is utilized as a source of supply.)

GERAGHTY, J. J.

(See also Lusczynski, N. J., 1956)

(See also Perlmutter, N. M., 1959c, 1963a)

1959 Ground-water problems in the New York City area: New York Acad. Sci. Annals, v. 80, art. 4, p. 1049-1059, 4 figs.
(The principal aquifers in the New York City area include (1) unconsolidated deposits of sand and gravel, (2) consolidated beds of sandstone and shale, (3) crystalline igneous and metamorphic rocks. Ground-water problems in the area include (1) decline of ground-water levels, (2) encroachment of salty water, (3) and problems arising from increasing ground-water temperatures, contamination and pollution by domestic and industrial wastes, and flooding of subsurface structures caused by pronounced recovery of ground-water levels.)

GETMAN, F. L.
1905 The new artesian water supply of Ithaca, New York: Eng. News, v. 53, Apr., p. 412-414.
(Describes the investigation for a ground-water supply at Ithaca, N.Y., after an outbreak of Typhoid. Test holes were drilled into a glacial artesian aquifer. Nine of the wells had a total flow of over 1,000,000 gpd at a temp of 52°F.)

GOESSMAN, C. A.
1866 Contribution to the chemistry of the mineral springs of Onondaga: Am. Jour. Sci., 2d ser., v. 42, p. 211-218, 368-374.
(Discusses some of the chemical characteristics of a few wells which supply brine to the Onondaga salt works. Contains data on experiments in which carbonic acid, sulfuric acid, lime, magnesium and sodium chloride were combined with brine in various proportions and the conclusions reached.)

GOLDRING, WINIFRED
1935 Geology of the Berne quadrangle: New York State Mus. Bull. 303, p. 20-24.
(Underground drainage through joints in the Onondaga Limestone has reduced surface drainage in the Thompson Lake depression. Except in the spring or after a season of heavy rains, the evaporation from the surface of the lake about equals the inflow. Thompson's Lake has no surface outlet, however, when the lake level is high, water drains through a cave at the southern end. By means of wide fissures formed by solution along joints this discharge passes, apparently undiminished in volume, to a large and deep spring about 1 1/2 miles to the southwest.)

1937 (Ruedemann, Rudolf, and Baudisch, Oskar) On the origin of the Saratoga mineral waters: Science, new ser., v. 86, p. 530-533.
(Discusses the sources of the ground water at Saratoga Springs, whether meteoric, connate, or magmatic. The water is charged with carbon dioxide, sodium, potassium compounds, and other minerals. The bedrock is of marine origin but the origin of the water is not definitely known.)

GOODELL, E. B.
1905 A review of the laws forbidding pollution of inland waters in the United States: U.S. Geol. Survey Water-Supply Paper 152, 2d ed., 149 p.
(Discusses rights of riparian owners to pure water as against one another; rights of the public to pure water; and conditions under which municipalities may dispose sewage to inland waters. Includes statutes of each state restricting pollution of water.)

GOULD, L. O.

(See Leggette, R. M., 1935)

GRABAU, A. W.

1906 Guide to the geology and paleontology of the Schoharie Valley in eastern New York: New York State Mus. Bull. 92, 386 p., 24 pl., 225 figs.

(Pages 348-351 are devoted to a discussion of limestone caverns, principally Ball's Cave and Howe's Cave. Pl. 22 shows the entrance to Howe's Cave and figs. 224 and 225 are sectional and plan views of Ball's Cave. Howe's Cave... "is of the nature of a long narrow fissure in the Manlius Limestone." The entrance to Ball's Cave is through a fissure in the Coeyman's Limestone and the main cavern is in the Manlius Limestone.)

GRATACAP, L. P.

1909 Geology of the city of New York: New York, Henry Holt and Co., 232 p., 65 figs., 4 maps.

(Contains the log of one well in Brooklyn. The well is 390 ft deep and penetrates Pleistocene and Cretaceous Formations.)

GREGORY, H. E.

1916 (and Ellis, A. J.) Ground water in the Hartford, Stamford, Salisbury, Willimantic, and Saybrook areas, Connecticut: U.S. Geol. Survey Water-Supply Paper 374.

(Briefly describes a municipal pumping plant in Brooklyn, N.Y., using a series of driven wells with a large air compressor as a pump.)

GRISWOLD, R. E.

1951 The ground-water resources of Wayne County, New York: New York Water Power and Control Comm. Bull. GW-29, 61 p., 3 pl., 8 figs.

(Small supplies of ground water may be obtained from either bedrock or surficial deposits. Potentially greater supplies may be developed along the buried valley of the Fairport-Lyons channel. The Lockport Dolomite and Salina Formation, which are the most prolific bedrock aquifers, commonly yield water of poor quality.

Data for the 607-sq mi county include 380 well and spring records, 24 well logs, and 38 chemical analyses. Maps show bedrock surface (scale about 1:235,000), and surficial and bedrock geology (scale about 1:160,000).)

GROSSMAN, I. G.

(See also Asselstine, E. S., 1955)

(See also Lusczynski, N. J., 1956)

(See also Simmons, E. T., 1961)

GROSSMAN, I. G.

1953 (and Yarger, L. B.) Water resources of the Rochester area, New York: U.S. Geol. Survey Circ. 246, 30 p., 2 pl., 19 figs.

(In the Rochester area total water use in 1952 was about 192 mgd, including 75 mgd for steam plants generating electric power. The present use is only a fraction of 1 percent of the estimated potential supply. Information on the chemical quality of water from the streams and principal ground-water reservoirs is given. Maps show aquifers, surface drainage, and bedrock surface. The occurrence and availability of ground water are discussed briefly, and tables show average and extreme water levels, yields, and temperatures. The public water supply systems are described. Laws affecting the use of water in the area are described briefly, and the water-resources potential of the area is summarized.)

1957 The ground-water resources of Putnam County, New York: New York Water Power and Control Comm. Bull. GW-37, 78 p., 2 pl., 7 figs.

(Ground-water supplies are obtainable both from the consolidated rocks which underlie the entire county, and from the unconsolidated deposits which are relatively thick in valleys but thin or absent in uplands. The ground-water supply is adequate for present demands and is capable of supporting substantially larger demands in the future.

The average yield of wells in bedrock, which consists principally of granite and gneiss and lesser amounts of diorite, schist, and marble, is 12 gpm. The average concentration of dissolved solids in bedrock, based on 66 determinations, is 122 ppm; for the marble alone the average is 293 ppm.

The most permeable deposits in the county are stratified sand and gravel which occur chiefly in the major valleys. The average yield of wells that penetrate these deposits is 33 gpm. Till, which underlies most hillsides and hilltops, provides water supplies which are adequate for small domestic and farm needs. Water from the unconsolidated deposits is similar in quality to water from the underlying bedrock.

Data for the 235-sq mi county include more than 400 well and spring records, 39 drillers' logs, more than 150 chemical analyses, and a map of the bedrock adapted from existing sources.)

GUERRERA, A. A.

(See Flynn, J. M., 1958)

HACKETT, O. M.

1965 Ground-water levels in the United States, 1958-62 - Northeastern States: U.S. Geol. Survey Water-Supply Paper 1782, p. 122-160.
(Contains listing of ground-water levels of observation wells in New York State.)

HALBERG, H. N.

1962 (and Hunt, O. P., and Pauszek, F. H.) Water resources of the Utica-Rome area, New York: U.S. Geol. Survey, Water-Supply Paper 1499-C, 46 p., 3 illus., 12 figs., 10 tables.
(The Mohawk River, augmented by its own tributaries and diversion of water from the Black and Chenango Rivers, flows at 560 mgd near Little Falls. Ninety-six percent of the 48.5 mgd used in the area is drawn from the Mohawk River. As little water is consumed, most of this 45 mgd is returned to the river, with an added supply of dissolved solids. Potential sources of large ground-water supplies exist in the sand and gravel units of Pleistocene age which floor the valleys. The water table is usually within 5 to 10 ft of the surface in these units and through hydraulic connection to the Mohawk River.)

1964 (and Hunt, O. P., and Pauszek, F. H.) Water resources of the Albany-Schenectady-Troy area, New York: U.S. Geol. Survey Water-Supply Paper 1499-D, 64 p., 2 illus., 30 figs., 11 tables.
(This report discusses the water resources of the Capitol District, indicating the productive units and noting the chemical quality of water derived from these units. The river infiltration supplies used in the area are discussed and the rises made of the water are described. Sixteen chemical analyses of water samples are included.)

HALE, MOSES

1835 Spring water versus river water for supplying the city of New York: New York, Marsh and Harrison, 50 p., 2 pl.
(Discusses the practicability of using ground water instead of surface water. The writer believes that a system of wells would supply the city of New York and the water would be of much better quality.)

HARDING, W. E.

(See LaSala, A. M., Jr., 1964)

HARRISON, J. B.

1955 Diffusion wells questioned: Am. City, Apr., p. 7.
(The difficulty with diffusion wells is they remain open ready to receive any liquid dumped into them. The question

HARRISON, J. B. (Cont'd.)
is will the aquifer be ruined if a poisonous substance enters the water-bearing formation? The degree of risk is probably small but the damage to the aquifer may be permanent.
This article was an answer to W. F. Welsch, diffusion wells, Jan. 1955.)

HARTNAGEL, C. A.
(See also Newland, D. H., 1928, 1936, 1939)

1927 The mining and quarry industries of New York from 1919 to 1924 including lists of operators: New York State Mus. Bull. 273, p. 10-15, 58-61.
(Lists the names and the locations of some of the larger commercial mineral springs in New York.)

HATCHETT, J. L.
(See Krieger, R. A., 1957)

HAYWOOD, J. K.
1907 Mineral waters of the United States: U.S. Dept. of Agr., Bur. of Chem., Bull. 91, 100 p.
(Discusses the constituents found in mineral water and lists analyses for mineral springs in different parts of the country. Those for New York include analyses for Lithia Spring, Deep Rock Water (spring), Great Bear Water (spring), and several springs at Saratoga Springs.)

HEATH, R. C.
(See also Simmons, E. T., 1961)

(See also Trainer, F. W., 1961)

1961 (and Salvas, E. H.) Some geochemical aspects of ground water in northern St. Lawrence County, New York: U.S. Geol. Survey Prof. Paper 424-C, art. 251.
(Saline ground water, believed to be a remnant of a sea invasion in post Pleistocene time, exists near Massena, New York. The ratio of sodium to calcium in water from bedrock indicates that ion exchange between sea water and silicates has taken place. Includes a map showing the occurrence of saline water, nomographs of selected chemical analyses, and a graph of the relationship between chloride and dissolved solids.)

1963a Ground water in New York State: The Conservationist, State of New York, Dept. of Conservation, v. 17, no. 7, 7 p., 1 illus., 5 figs.
(Defines the term ground water. With specific examples from New York State, the sources, reservoirs, and occurrences of ground water, are described. The distribution of ground water throughout the State is

HEATH, R. C. (Cont'd.)

outlined, and some of the problems of artificially and naturally contaminated ground water are discussed.)

1963b (and Mack, F. K., and Tannenbaum, J. A.) Ground-water studies in Saratoga County, New York: New York Water Resources Comm. Bull. GW-49, 128 p., 38 figs., 10 tables.

(The geology and ground-water conditions of the area are described. In the western part of the area, shallow dug wells yield small domestic supplies from till. In the eastern portion stratified sands and gravels yield 30 gpm to small-diameter driven wells while larger wells, drawing from river infiltration sources and a lower artesian aquifer, yield up to 750 gpm. Bedrock wells yield an average of 13 gpm. In the Precambrian Rock in the northwestern part of the area the average yield is 6 gpm, the Potsdam Sandstone and Theresa Dolomite wells bordering the Precambrian yield 19 gpm, and carbonate rocks further south yield 31 gpm. The eastern and southern portions are underlain by a shale unit yielding 9 gpm. The report contains maps of the principal unconsolidated deposits and bedrock formations with 666 well records, 11 spring records, and 53 chemical analyses.)

1963c Seasonal temperature fluctuation in surficial sand near Albany, New York: U.S. Geol. Survey Prof. Paper 475-D, art. 168, 5 p., 3 figs., 1 table.

(Subsurface temperature fluctuations are due to thermal waves that originate at the land surface in response to changes in air temperature. The annual average temperature of the zone of saturation, 6 to 18 ft below land surface, is about 3°F higher than the annual average air temperature.)

1964 Ground water in New York: New York Water Resources Comm. Bull. GW-51, Folder, 3 illus., 8 figs., 1 table.

(Ground water is defined. With reference to examples from New York State, the sources and reservoirs and occurrences of ground water are described. The relationship of ground water and topography is discussed, and Long Island's ground-water reservoir is compared to that of upstate New York. Contamination of ground-water supplies is discussed, and recommendations are made to avoid such contamination. The distribution and water-bearing qualities of the principal aquifers in New York State are described.)

1966 (and Foxworthy, B. L., and Cohen, Philip) The changing pattern of ground-water development on Long Island, New York: U.S. Geol. Survey Circ. 524.

(Describes the geologic environment of the ground-water system and how the development of this system has changed with the passage of time. Also treats areal differences of ground-water development at present time.)

HERING, R.

(See Burr, W. H., 1903)

HOBBS, W. H.

1905 The configuration of the rock floor of greater New York: U.S. Geol. Survey Bull. 270, 96 p., 5 pl., 6 figs.
(Contains tabular data on depths to bedrock on Manhattan Island and the type of bedrock penetrated.)

HOFFMAN, J. F.

(See also Lusczynski, N. J., 1951a, 1951b)

(See also DeLuca, F. A., 1965)

1956 This diffusion well won't flood: Eng. News-Record, v. 156, no. 10, p. 55-56.
(When the law requires well water to be returned to its source and the water table is high, the commonly used diffusion well poses a problem. This problem was solved by constructing a large-diameter diffusion well (7.5 ft) and using 13 ft of slotted, cement casing. Recharging at the rate of 52 gpm, the water level rose only 1.7 ft above the static water table.)

1958 (and Spiegel, S. J.) Chloride concentration and temperature of water from wells in Suffolk County, Long Island, New York, 1928-53: New York Water Power and Control Comm. Bull. GW-38, 55 p., 1 pl., 2 figs.
(Normal chloride concentrations in the ground water of Suffolk County range from 5 ppm in the center of the western part of the county to 25 ppm at the eastern tips of the North Fork and South Fork peninsulas. Contamination of a well-water sample was established by comparison of its chloride concentration with that normally expected in the area. The data suggest that, besides sea water, fertilizer and sewage are sources of contamination that contribute sizeable amounts of chloride to the ground water. Sea-water contamination has occurred only in isolated wells and is restricted largely to the North Fork area. Contamination by fertilizer occurs principally in the Riverhead and North Fork areas, the former having a chloride concentration as high as 112 ppm. Contamination by sewage has raised the chloride concentration of surrounding ground water in some places to as much as 50 ppm. In addition there is a possibility that some contamination has resulted from industrial wastes and from salts used in highway maintenance.
Ground-water temperatures at most wells less than 300 ft deep ranged from 50° to 55°F. In deeper wells, the temperatures ranged from 50° to 64°F. Seasonal temperature changes in the water pumped from wells of the Riverhead Water District indicate that water from the Peconic River recharges the aquifer tapped by the wells.
Data for the 920-sq mi county include the results of about 1,000 chloride determinations.)

HOFFMAN, J. F.

1959 Ground-water utilization, Suffolk County, L.I., New York: Am. Soc. Civil Engineers Proc., v. 85, no. HY7, July.
(Briefly outlines the ground-water hydrology and geology of Suffolk County and describes the factors involved in the utilization of ground water. Discusses the present problems and other problems that may arise in the future.)

1961a Hydrology of the shallow ground-water reservoir of the town of Southold, Suffolk County, Long Island, New York: New York Water Power and Control Comm. Bull. GW-45, 49 p., 1 pl., 14 figs.
(Most of the available fresh ground water in the town of Southold in northeastern Long Island is obtained from storage in the shallow Pleistocene sand aquifer which (1) is bounded on three sides by sea water, (2) is underlain by salty water, (3) has a natural replenishment solely from precipitation, and (4) has an expected yield of 19 mgd. Sea-water encroachment has been restricted thus far to near-shore areas where altitudes of the water table are less than 2 ft. Conservative rates of annual withdrawal will prevent serious overdraft.)

1961b (and Lubke, E. R.) Ground-water levels and their relationship to ground-water problems in Suffolk County, Long Island, New York: New York Water Power and Control Comm. Bull. GW-44, 42 p., 2 pl., 6 figs.
(Measurements of water level in 65 water-table wells in Suffolk County, the eastern two-thirds of Long Island, N.Y., are presented.
Usefulness of water-table measurements is briefly discussed with respect to (1) ground-water conditions, (2) areas of overdevelopment, (3) salt-water encroachment, and (4) building construction.)

HOFFMEISTER, J. E.

1941 (and Singewald, Q. D.) Results to date of exploration for ground water in the buried Genesee Valley (abs.): Econ. Geol., v. 36, no. 1, p. 113.
(A seismic survey to determine the location of a buried valley near Rush was made by the Geophysical Branch of the U.S. Geol. Survey. Two north-south traverses revealed the existence of a deep east-west valley 1 mile north of its supposed location.)

HOLLAND, W. T.

1938 (and Jarvis, C. S.) Inventory of unpublished hydrologic data: U.S. Geol. Survey Water-Supply Paper 837.
(Ground-water levels were recorded in the vicinity of Voorheesville from 1915 to 1936, by Mr. Robert E. Horton.)

HOLLICK, ARTHUR

(See also Merrill, F. J. H., 1902)

1887 Well at Clifton, Staten Island: Staten Island Nat. Sci. Assoc. Proc., Oct.

(Briefly discusses a well about 900 ft deep. The well was finished in a mica schist which supposedly contained gold, copper, and rubies.)

HOLLISTER, G. B.

1905 Waters of a gravel-filled valley near Tully, N.Y., in Fuller, M. L., Contributions to the hydrology of eastern United States, 1905: U.S. Geol. Survey Water-Supply Paper 145, p. 179-184, 1 fig.

(Describes the spring seepage from the north slope of the Tully moraine. Discharge of the springs was about 4.5 mgd on November 7, 1904. Chloride and alkalinity of some of the springs and of some of the lakes on the southern slope of the moraine are tabulated.)

HOLLYDAY, E. F.

(See Seaber, Paul, 1965)

HOPKINS, T. C.

1910 Changes produced on springs by a sinking water table (abs.): Geol. Soc. Am. Bull., v. 21.

(Two seasons (1908-09 were exceptionally dry in New York. The water table was lower during this period than in many years. Besides the drying up of many springs and wells some of them have changed their chemical composition. A spring at Edwards Falls near Manlius was a calcareous spring until last year when it gave off considerable hydrogen sulfide. Another spring 4 miles south of Syracuse has changed from a carbonate spring to a hydrogen sulfide spring.

Also summarized in Science (New Ser.) v. 32, no. 814, 1910, p. 190.

HORTON, R. E.

(See Veatch, A. C., 1906b)

HUNT, O. P.

(See Halberg, H. N., 1962, 1964)

HUNT, T. S.

1849 On acid springs and gypsum deposits of the Onondaga salt group: Am. Jour. Sci., 2d ser., v. 7, p. 175-178.

(Discusses the antiquity of the acid springs in the Onondaga salt group, deducing that most of them cannot be more than 100 years old because the water contains a large amount of sulfuric acid and would have dissolved much larger openings than are now present. If these springs had been in existence for a period much greater than 100 years the openings would have been much larger.)

ISBISTER, JOHN

1959 Ground-water levels and related hydrologic data from selected observation wells in Nassau County, Long Island, New York: New York Water Power and Control Comm. Bull. GW-41, 42 p., 1 pl., 7 figs.
(Contains water-level records not previously published and typical hydrographs showing water-level fluctuations. Briefly reviews geology and ground-water resources of the county.)

1963 Relation of fresh water to salt water at Centre Island, Nassau County, New York: U.S. Geol. Survey Prof. Paper 450-E, art. 226, 3 p., 2 figs.
(This report briefly describes the ground-water condition of Centre Island in Nassau County. There are two principle aquifers, a water table aquifer which is perched on salt water in the Pleistocene deposits, and an artesian aquifer in the Lloyd Sand Member of the Raritan Formation.)

1966 Geology and hydrology of northeastern Nassau County, Long Island, New York: U.S. Geol. Survey Water-Supply Paper 1825, 5 pls., 16 figs., 20 tables.
(This report describes the water resources of northeastern Nassau County with detailed descriptions of the aquifers. The aquifers include glacial outwash, the Magothy (?) Formation, the Lloyd Sand Member of the Raritan Formation, and the Jameco Gravels.
Evapotranspiration experiments were performed and the results presented. Salt-water encroachment is discussed. Included are 43 complete chemical analyses and about 200 partial analyses.)

JACKSON, D. C.

1905 The normal distribution of chlorine in the natural waters of New York and New England: U.S. Geol. Survey Water-Supply Paper 144, 31 p., 5 pl.
(Discusses the content of chloride in coast and inland waters and its value in indicating pollution of streams and wells. Describes the solutions and methods used in determinations of chloride. Contains maps showing the normal distribution of chloride in surface and ground waters in the New England States and New York, and tables giving data on which the maps are based.)

JACOB, C. E.

1938 Ground-water underflow in Croton Valley, N.Y., a comparison of field and laboratory methods: Am. Geophys. Union Trans., v. 19, pt. 1, Apr., p. 419-430.
(Gives data on test wells in the valley, water-level measurements and determinations of the underflow by the Slichter method, the Thiem method, and the Theis method. The values of the underflow, determined by these methods,

JACOB, C. E. (Cont'd.)

ranged from 86,000 to 99,000 gpd. In his summary and conclusions the author discusses the weaknesses and the advantages of each method used.)

1939 Fluctuations in artesian pressure produced by passing railroad trains as shown in a well on Long Island, New York: Am. Geophys. Union Trans., v. 20, pt. 4, Apr., p 666-674.
(Describes changes in ground-water level due to rapid variation in load on an aquifer during the passage of railroad trains.)

1941 Notes on the elasticity of the Lloyd Sand on Long Island, N.Y.: Am. Geophys. Union Trans., v. 22, pt. 3, May, p. 783-787.
(Describes the water-bearing characteristics of the Lloyd Sand and gives a mathematical discussion of its high apparent compressibility.)

1943 Correlation of ground-water levels and precipitation on Long Island, N.Y., Part 1, Theory: Am. Geophys. Union Trans., v. 24, pt. 2, Apr., p. 564-573.
(A mathematical discussion of the theory of movement of ground water and a short discussion of correlation of data. Also reprinted with same paging in New York Water Power and Control Comm. Bull. GW-14, Albany, N.Y., 1945.)

1944 Correlation of ground-water levels and precipitation on Long Island, New York, Part 2, Correlation of data: Am. Geophys. Union Trans., v. 25, pt. 6, p. 929-939.
(An effort was made to empirically improve upon the linear correlation between the composite average water level and the yearly means of the 25-year average precipitation rate by adding an arbitrary constant to values of the former before determining their ratio to values of the latter. The best correlation was obtained by adding 15 ft to the composite average water level.)

1945a The water table in the western and central parts of Long Island, N.Y.: New York Water Power and Control Comm. Bull. GW-12, 24 p., 2 pl.
(Summarizes the geology and early ground-water records. Gives tabulated data on shallow observation wells. Plates show contour of the water table in May 1943 and profiles of the water table in 1903 and 1943.)

JACOB, C. E.

1945b Correlation of ground-water levels and precipitation on Long Island, N.Y., Part 2, Correlation of data: Am. Geophys. Union Trans., v. 26, pt. 6, May, p. 929-939.
(Gives data on 14 shallow test wells and presents a map of Long Island showing configuration of main ground-water table. Gives graphic well records of the fluctuation of the water level. Also reprinted with same paging in New York Water Power and Control Comm. Bull. GW-14, Albany, N.Y., 1945.)

1947 Drawdown test to determine effective radius of artesian well: Am. Soc. Civil Engineers Trans., v. 112, art. 2321, 22 p.
(The theory of multiple-step drawdown test is illustrated by test run in 1943 at Bethpage, Long Island. The test had 4 periods of about 1 hr. duration each. Values of drawdown increments were plotted against values of time on a logarithmic scale. Maximum discharge was 1,520 gpm, the "well loss" was computed at 15.5 ft.)

JARVIS, C. S.

(See Holland, W. T., 1938)

JASTER, M. C.

(See Roberts, C. M., 1947)

JEFFORDS, R. M.

1950 The ground-water resources of Montgomery County, New York: New York Water Power and Control Comm. Bull. GW-23, 63 p., 2 pl., 11 figs.
(The chief water-bearing formations comprise the Little Falls Dolomite, the Canajoharie and Utica Shale, and unconsolidated deposits of glacial drift and gravel. Ground-water use does not exceed the annual recharge in the area as a whole, but heavily pumped areas in Canajoharie and Amsterdam may be approaching a critical condition.
Data for the 400-sq mi county include 365 well and spring records, 8 well logs, and 35 chemical analyses. Geologic maps of surficial deposits and bedrock are adapted from existing sources.)

JOHNSON, A. H.

(See also Lusczynski, N. J., 1951c)

1948 Ground-water recharge on Long Island: Am. Water Works Assoc. Jour., v. 40, no. 11, 3 figs., 6 tables.
(Diffusion wells have been very successful in replenishing ground water on Long Island. Industrial wells having a capacity of over 100,000 gpd are prohibited unless the water is returned to the ground in an uncontaminated condition. Contains tabular data on the quantity of well water recharged on Long Island.)

JOHNSON, A. H.

1952a (and Waterman, W. G.) Withdrawal of ground water on Long Island, New York: New York Water Power and Control Comm. Bull. GW-28, 13 p., 5 figs.
(Briefly describes the source, water-bearing formations, and use of ground water on Long Island. Contains tabular data on the average withdrawal of water from the different aquifers in Kings, Queens, and Nassau Counties.)

1952b (and others) Records of wells in Suffolk County, New York: New York Water Power and Control Comm. Bull. GW-31, supp. 2, 137 p.
(Contains tabular data on water levels, drawdowns, pumping rates and water-bearing formations in Suffolk County, Long Island, N.Y. Chloride analyses were made on 58 wells.)

1955 Conservation of ground water on Long Island: Am. Water Works Assoc. Jour., v. 47, no. 4.
(Ground-water use increased greatly after 1917. In the 1930's salt-water encroachment became a serious problem in western Long Island, and wells with a capacity of over 100,000 gpd had to be approved by the Water Power and Control Comm. Since then, the Commission has required all cooling water to be returned uncontaminated to the aquifer. Seepage basins are being constructed to recharge water to the ground.)

JOHNSON, B. L.

(See Fuller, M. L., 1906a)

JOHNSON, D. W.

1905 Relation of the law to underground waters: U.S. Geol. Survey Water-Supply Paper 122, 55 p.
(Briefly discusses several common-law cases pertaining to ground water in the State.)

THE JOHNSON NATIONAL DRILLERS JOURNAL

1948 Protection of ground water in New York: The Johnson National Drillers Jour., v. 20, no. 2, p. 6.
(Discusses the use of recharge basins and wells in preventing the further intrusion of salt water on Long Island.)

1952 Nassau County, New York, conservation: The Johnson National Drillers Jour., v. 24, no. 5, p. 6.
(Briefly mentions salt-water encroachment problems on Long Island and methods of conserving water by using artificial recharge basins.)

1953 Ground-water resources - large cities and industrial areas: v. 25, no. 4, 1 p.
(Describes the water resources of the Buffalo-Niagara Falls area giving averages of well yields in the various aquifers.)

THE JOHNSON NATIONAL DRILLERS JOURNAL

1957 Recharge operations can conserve water resources: v. 29, no. 2, 2 p., 1 illus.
(Briefly describes recharge basins for storm-water recharge on Long Island.)

JOHNSTON, R. H.
(See also Winslow, J. D., 1965)

1962 Water-bearing characteristics of the Lockport Dolomite near Niagara Falls, New York: U.S. Geol. Survey Prof. Paper 450-C, art. 110, p. 123-125, 3 figs.
(Ground water occurs principally within seven prominent zones of jointing parallel to bedding in the Lockport Dolomite. These zones have much higher permeability than the surrounding rock, and are, in effect, separate and distinct artesian aquifers. This report includes 316 well and spring records, 58 well logs, and 83 chemical analyses.)

1964 Ground water in the Niagara Falls area, New York: New York Water Resources Comm. Bull. GW-53, 93 p., 3 pl., 19 figs., 9 tables.
(This report tabulates 316 well and spring records, logs of 58 wells and test borings, and 83 chemical analyses of ground-water samples from the Niagara Falls area. The available ground water in this area is mainly confined to the Lockport Dolomite.)

KAMMERER, J. C.
(See also MacKichan, K. A., 1961)

1957 Records available to September 30, 1956 on use of water in the Delaware Basin project area: U.S. Geol. Survey open-file report, 33 p., 3 figs., 16 tables.
(Summary of the source and use of the water resources in the Delaware River basin. Contains data on present use, quality, and projected future use of ground water in the area.)

KANTROWITZ, I. H.
(See Pluhowski, E. J., 1962, 1963, 1964)

KEIS, F. J.
1932 The artesian water supply for the Latham water district, New York: Am. Water Works Assoc. Jour., v. 24, no. 4, p. 547-55.
(Describes test drilling in the Latham, N.Y. area. One well flowed at 320 gpm with a head of 25 ft.)

KEIS, F. J.

1933 Copious artesian supply serves entire township: Eng. News-Record, v. 111, p. 627.
(Describes the accidental findings of an artesian aquifer southwest of Latham, N.Y. Several wells flowed initially at 500,000 gpd and had a temperature of 42°F.)

KEMP, J. F.

1912 The mineral springs of Saratoga: New York State Mus. Bull. 159, 79 p., 8 figs., 7 tables.
(A general discussion of the occurrence, chemical character, and origin of the mineral waters in the vicinity of Saratoga Springs. The tables contain numerous chemical analyses made between the early 1800's, and the early 1900's, including those by Steel, Chandler, and the U.S. Dept. of Agr. The mineral waters occur principally in the Little Falls Dolomite (now Gailor Dolomite). The appearance of the waters at Saratoga Springs appears to be controlled by the Saratoga fault.
Similar article also published in an Am. Inst. Metall. Eng. Bull. in 1913.)

KESTNER, J. A., JR.

1957 Chemical injection into well field will prevent clogging of aquifer: Water Works Eng., v. 110, no. 7, p. 704-706, illus.
(Discusses the chemical treatment of screens of the supply wells of Indian Lake to remove iron clogging.)

KINDLE, E. M.

(See also Williams, H. S., 1909)

1905a Salt and other resources of the Watkins Glen district, New York, in Emmons, S. F. and Hayes, C. W., Contributions to economic geology, 1904: U.S. Geol. Survey Bull. 260, p. 568-569.
(Contains logs for two test holes drilled in western New York.)

1905b Water resources of the Catatonk area, N.Y., in Fuller, M. L., Contributions to the hydrology of eastern United States, 1905: U.S. Geol. Survey Water-Supply Paper 145, p. 53-57.
(Briefly describes the ground-water resources of the Dryden, Harford, Owego, and Apalachin 15-minute quadrangles. Specific discussions include the wells at Ithaca and Slaterville and several mineral springs. The ground-water conditions in this quadrangle are also described in Geologic Folio 169.)

1913 (and Taylor, F. B.) Niagara Folio: U.S. Geol. Survey Geol. Atlas Folio 190, 26 p., 25 pl., 16 figs.
Includes brief discussion of a few wells in the Niagara Falls area. Contains a chemical analysis of a sample of highly mineralized ground water.)

KREIDLER, W. L.

1957 The occurrence of Silurian Salt in New York State: New York State Mus. and Sci. Service Bull. 361, 56 p., 2 pl., 2 tables.
(Contains logs of deep wells in New York State and notes which penetrated salt formations and at what depth.)

1959 Selected deep wells and areas of gas production in eastern and central New York: New York State Mus. and Sci. Service Bull. 373, 243 p., 1 map, 4 tables.
(Contains logs of deep wells in New York State and notes which were dry holes.)

KRIEGER, R. A.

1957 (and Hatchett, J. L., and Poole, J. L.) Preliminary survey of the saline-water resources of the United States: U.S. Geol. Survey Water-Supply Paper 1374, 172 p., 2 pl., 3 figs., 7 tables.
(Lists three wells on Long Island and includes data on depth, diameter, water-bearing formation, water level, yield, and chemical content.)

KUMMEL, H. B.

(See Darton, N. H., 1908)

LAASE, W. F.

(See also Suter, Russell, 1938b)

1915 The Brooklyn water supply: New England Water Works Assoc. Jour., v. 29, p. 547-553.
(Briefly mentions the ground-water source of Brooklyn, N.Y. Discusses methods of driving wells, setting screens, and constructing infiltration galleries.)

1932 Construction and maintenance of deep wells in sand strata on Long Island, New York: Am. Water Works Assoc. Jour., v. 24, p. 1523-1533, 1 fig.
(Discusses some of the older, deep wells on Long Island and the problems due to clogging with fine sand or iron concretions. The newer wells use a brass screen which is more corrosion resistant than the older cast iron screens and consequently reduce maintenance costs.)

1938 The present condition of New York City's Long Island sources of water supply: Am. Water Works Assoc. Jour., v. 30, p. 298-301.
(Discusses briefly the safe yield of Long Island ground-water supplies. In Brooklyn the safe yield has been exceeded. This is due to the reduction of infiltration area with the result that 70 percent of all potential recharge is channeled out to sea through a system of storm sewers.)

LAASE, W. F.

1895 Auxiliary supply of the Water Works of Addison, New York: Eng. News, Mar. 14, p. 163.

(Describes the construction of a dug well at Addison, N.Y. The ground water is used to supplement a surface-water supply in extremely dry years. The well was 12 1/2 ft in diameter and 23 ft deep. Drive points were driven up to 20 ft below the bottom of the well giving a supply of 165,000 gpd.)

LANG, S. M.

(See Barksdale, H. C., 1955)

LANG, W. B.

1959 The origin of some natural carbon dioxide gases: Am. Geophys. Union, Jour. of Geophys. Research, v. 64, no. 1, p. 127-131, 3 tables.

(Analyses of the carbon 12 and carbon 13 in sources of carbon shows that the ratio of C^{12}/C^{13} in natural carbon-dioxide gas is essentially the same as in marine limestones. Several areas in the United States and Mexico in which carbon-dioxide gas is either obtained from wells or issues with water in springs, including Saratoga Springs, are discussed. "In most of these carbon-dioxide gas localities there is evidence of marine limestone in the local geologic sections, and in others it may be inferred. Except for Saratoga Springs the areas where carbon- dioxide gas samples were taken show evidence of associated igneous activity.")

LaSALA, A. M., JR.

1964 (and Harding, W. E., and Archer, R. J.) Water resources of the Lake Erie-Niagara area, New York: New York Water Resources Comm. Bull. GW-52, 8 p., 1 illus., 14 figs., 4 tables.

(This report discusses briefly the geology, topography, climate and water resources in the Erie-Niagara basin area. The water problems of the area are described with reference to amount, pollution, water quality, and uneven distribution of water. The ground-water potential of the area is described, and the chemical quality of the water is outlined.)

1967 New approaches to water-resources investigations in upstate New York: Ground Water, Tech. Jour. of Natl. Water Well Assoc., v. 5, no. 4, p. 6-11.

(Describes several approaches in measuring total water resources of basin. Some approaches are:

(1) low-streamflow data obtained to define principal ground-water discharge areas;
(2) estimate of ground-water discharge past stream gages by correlation with ground-water levels;
(3) assessment of recharge with streamflow records;
(4) estimate of chemical hydrograph on basis of ground-water and overland-runoff quality.)

LAUMAN, H. E.

1962 "Detergent cocktails": Water Well Jour., v. 16, no. 6.
(Describes the several aspects of the synthetic-detergent problem. Approximately 500 privately-owned wells in Suffolk County out of a total of 60,000 to 70,000 are known to be contaminated with detergents. Recent rulings by the Federal Housing Agency limit the use of private wells to properties with a minimum of 20,000 sq ft where the water table is 40 ft below land surface. The well must be 40 ft below the water table and 100 ft from the nearest cesspool or sewage pit. Contains a glossary of synthetic-detergent nomenclature.)

LEGGETTE, R. M.

(See also Thompson, D. G., 1936)

1935 (and Gould, L. O., and Dollen, B. H.) Ground-water resources of Monroe County, N.Y.: Monroe County Regional Plan. Board, Rochester, N.Y., Aug., 141 p., mimeo.
(Briefly describes the geology. Paleozoic sedimentary rocks are overlain by glacial drift to a maximum depth of 300 ft. The preglacial valley of the Genesee River and its main tributaries is the most promising source for large quantities of ground water. Gives partial analyses of 1,913 samples of water and more detailed analyses of 179 samples. Contains table of 116 springs and tabulated records of more than 4,000 wells. Includes map of the bedrock surface and maps showing well locations.)

1936 Long-time records of ground-water levels on Long Island, New York: Am. Geophys. Union Trans., v. 17, p. 341, pl. 2, 2 figs.
(Water-level measurements were begun in 1851 on Long Island. In 1903 New York City began measurements in Queens, Nassau and Suffolk Counties. These measurements were continued at irregular intervals until 1918. In 1932 the U.S. Geol. Survey started periodic measurements in some of these same test wells. Contains charts of precipitation and ground-water withdrawal on Long Island.)

1937 The mutual interference of artesian wells on Long Island, N.Y.: Am. Geophys. Union Trans., v. 18, pt. 2, July, p. 490-494.
(Interference tests on several artesian wells pumping from the Lloyd Sand show that the beginning or cessation of pumping in one group of wells has a measurable effect on artesian head in wells as much as 7 miles distant.)

LEGGETTE, R. M.

1938 (and Brashears, M. L., Jr.) Ground water for air conditioning on Long Island, New York: Am. Geophys. Union Trans., v. 19, pt. 1, Aug., p. 412-418.

(Use of ground water for air conditioning has resulted in considerable increase in pumpage on the western end of Long Island where the draft on the ground-water reservoir was already excessive. In order to conserve the ground water, the N.Y. Water Power and Control Comm. requires that water from new wells used for air conditioning shall be returned to the ground. This is usually done through a recharge well. The temperature of ground water has been increased 10 to 15°F by the return of the used water.)

1944 (and Brashears, M. L. Jr.) Records of wells in Kings County, New York: New York Water Power and Control Comm. Bull. GW-8, 135 p.

(Contains tabular data on water levels, drawdowns, pumping rates, water-bearing formations, and depths of wells. Chloride analyses were made on some of the wells. Included is a map showing well locations in Kings County.)

1947 Salt-water encroachment in the Lloyd Sand on Long Island, New York: Water Works Eng., v. 100, p. 1076-1079, 1107-1109.

(The Ghyben-Herzberg principle is explained as it applies to artesian conditions and the Lloyd Sand on Long Island. Areas of possible encroachment are mentioned.)

LEIGHTON, M. O.

1904 Quality of water in the Susquehanna River drainage basin: U.S. Geol. Survey Water-Supply Paper 108, 76 p., 4 pl.

(Contains analyses of ground water and discussion of the quality of the water.)

LEY, PETER

1955 Pumping stations in residential areas: Am. Water Works Assoc. Jour., v. 47, no. 11, p. 1039-1047.

(With the great increase of population on Long Island, pumping stations which were built in or near residential areas soon were judged eyesores. The Water Supply Company initiated a station beautification program which alleviated any ill feelings that were held by individuals in the community.)

LIEBER, MAXIM

(See also Davids, H. W., 1951)

(See also Perlmutter, N. M., 1963c, 1964)

LIEBER, MAXIM

1954 (and Welsch, W. F.) Contamination of ground water by cadmium: Am. Water Works Assoc. Jour., v. 46, no. 6, p. 541-547.
(Contamination of ground water by cadmium wastes created a dangerous situation in parts of Long Island. Test drilling and water sampling delineated the area of contamination, the source of which was then eliminated. There were a few instances of nausea reported, supposedly due to drinking contaminated water.)

1955 Discussion of a paper by F. W. Welsch, ground-water pollution by industrial wastes: Sewage and Indus. Wastes, v. 27, no. 9, p. 1069-1072, 4 figs.
(The prime interest of this survey was to determine as accurately as possible the direction and rate of flow of the cadmium contaminant. This was accomplished by locating the maximum cadmium levels through a series of test wells in the area of concern.)

1964 (and Perlmutter, N. M., and Frauenthal, H. L.) Cadmium and hexavalent chromium in Nassau County ground water: Am. Water Works Assoc. Jour., v. 56, no. 6, 9 p., 1 illus., 1 fig., 3 tables.
(Describes the contamination of the water-table aquifer by a slug of cadmium- and chromium-bearing water discharged into the aquifer by an industrial plant. The slug has been in the ground over 10 years and is 4,200 ft long and 1,000 ft wide. Hexavalent chromium reaches a maximum of 14 ppm and cadmium 3.7 ppm. Control measures starting in 1949 have eliminated hexavalent chromium from entering the aquifer but cadmium is still being discharged by the plant.)

LINDSAY, N. L.

(See Riddick, T. M., 1958)

LINES, E. F.

(See Fuller, M. L., 1905)

LOHR, E. W.

1953 (White, W. F., and Beamer, N. H.) The industrial utility of public water supplies in the middle Atlantic States, 1952: U.S. Geol. Survey Circ. 283, p. 33-77.
(Contains chemical analyses for 43 public water supplies in New York.)

1954 (and Love, S. K.) The industrial utility of public water supplies in the United States, 1952: U.S. Geol. Survey Water-Supply Paper 1299, 639 p., 5 pl., 3 figs.
(Contains chemical analyses of water from public water supplies in New York State of towns with a population greater than 15,000. It includes data on the source, treatment, storage, population served, and ownership of

LOHR, E. W. (Cont'd.)
the water supply. The first 49 pages contain analyses of the data reported including statistical tables that show the hardness of public water supplies and brief discussions on the treatment of water.)

LOOMIS, A. W.
1930 Modern water system aids growth of Port Washington: Compressed Air Mag., v. 35, no. 12, p. 3326-3329.
(Describes the use of air-lift pumps to provide the city with 1,900,000 gpd of water. The city has 7 wells, 5 of which are pumped by direct lift, and 2 by air lift.)

LOVE, S. K.
(See Lohr, E. W., 1954)

LUBKE, E. R.
(See also Hoffman, J. F., 1961b)

(See also DeLuca, F. A., 1965)

1964 Hydrogeology of the Huntington-Smithtown area, Suffolk County, New York: U.S. Geol. Survey Water-Supply Paper 1669-D, 68 p., 6 illus., 12 figs., 7 tables.
(This report describes the geology and ground-water conditions of the Huntington-Smithtown area. The area is underlain by 400 to 1,300 ft of unconsolidated deposits of Pleistocene and Late Cretaceous age. Three principal aquifers supply 11 bgy to the area. The water-table aquifer in Pleistocene drift supplies 53 percent of this total, and the upper of the two artesian aquifers in the Cretaceous units supplies over 40 percent. The problem of increased demands in water needs and a possible contamination problem due to detergents is discussed and suggestions are made to cope with these problems.)

LUSCZYNSKI, N. J.
1947 Recovery of water levels in the Flatbush area of Brooklyn, N.Y., during the summer of 1947: U.S. Geol. Survey, open-file report, Oct. 20, 8 p.
(When the New York Water Service Corp. permanently shut down its ground-water supply plant, it represented a 50 percent reduction in ground-water withdrawal in Brooklyn. Water levels recovered 3.9 ft in the first 3 months of the recovery period in both water table and artesian wells.)

1951a (and Hoffman, J. F.) Salinity of ground water in Riverhead and Southold Townships, Suffolk County, New York, 1948-50: U.S. Geol. Survey, open-file report, 4 p., 3 tables.
(Contains tabular data on the chloride content of 173 wells and 7 ponds. The chemical analyses indicate there is little or no salt-water encroachment in the areas where samples were collected, although it is potentially a serious problem.)

LUSCZYNSKI, N. J.

1951b (and Hoffman, J. F.) The water table as of April 1950 in Southold Township, Suffolk County, Long Island, New York: U.S. Geol. Survey mimeo. rept., 4 p.
(Discusses attempts to evaluate water-table fluctuations, whether natural ones resulting from varying rates of precipitation, or artificial fluctuations resulting from pumping.)

1951c (and Johnson, A. H.) The water table in Long Island, New York, in January 1951: New York Water Power and Control Comm. Bull. GW-27, 28 p., 4 pl.
(The report reviews the early ground-water records for Long Island. Illustrations include a water-level map for January 1951 and profiles of the water table for 1903 and 1951. Well records and water-level measurements are tabulated for 533 shallow wells used in preparing the map. The map (scale about 1:170,000) is in three sections. This report is principally a revision of N.Y. Water Power and Control Comm. Bull. GW-12.)

1952 The recovery of ground-water levels in Brooklyn, New York, from 1947 to 1950: U.S. Geol. Survey Circ. 167, 29 p., 2 pl., 12 figs.
(As a result of condemnation proceedings by the city of New York, the New York Water Service Corp., on June 29-30, 1947, closed down permanently its entire ground-water facilities with a resultant reduction of more than 50 percent in the net ground-water withdrawal in Kings County (Brooklyn). The water table, far below sea level for many years, recovered as much as 19 ft at some places in central Brooklyn from June 1947 to December 1950.
Chloride determinations, water-level data, contour maps, profiles, and hydrographs of ground-water levels for the period 1903-50 are presented and discussed. The report includes a compilation of the withdrawals by public water supply companies and industrial concerns, and a brief review of the geology of Kings County.)

1956 (and Geraghty, J. J., Asselstine, E. S., and Grossman, I. G.) Saline waters in New York State: New York Water Power and Control Comm. Bull. GW-36, 15 p., 1 fig.
(This report which contains data on the occurrence, distribution, quantity, and chemical quality of saline waters, is divided into two parts. One part pertains to Long Island, Staten Island, and Manhattan, the other to upstate New York. Saline water is defined as any mixture of fresh and salt water having more than 1,000 ppm of dissolved solids.
In the Long Island area saline water is limited largely to shoreline and offshore areas, although local occurrences are reported for central Kings County. Saline water occurs

LUSCZYNSKI, N. J. (Cont'd.)
extensively in the vicinity of Jamaica Bay and along the East River in unconsolidated deposits of Late Cretaceous and Pleistocene age.
In upstate New York saline water occurs in both consolidated and unconsolidated deposits, principally in four areas--the St. Lawrence-Champlain lowland, the Ontario lowland, the southern tier counties, and the east-central part of the state. The bedrock formations that contain such water are predominantly shale and limestone of early Paleozoic age. Saline water in unconsolidated deposits is found also along the lower reaches of the Hudson River. Data include well records and chemical analyses of 84 wells and springs.)

1960 (and Swarzenski, W. V.) Position of the salt-water body in the Magothy (?) Formation in the Cedarhurst-Woodmere area of southwestern Nassau County, Long Island, New York: Econ. Geology, v. 55, no. 8, p. 1739-1750.
(Discusses the position and movement of salt water landward from the south shore bays of Long Island. The upper limit of the salt water was found at depths increasing progressively in a landward direction. Electric-log data show that the upper boundary of the salt water moved upward 21 ft between 1952 and 1958. From this information it is inferred that the leading edge of the salt-water front had moved landward about 2,000 ft.)

1961a Filter-press method of extracting water samples for chloride analysis: U.S. Geol. Survey Water-Supply Paper 1544-A, 8 p., 1 fig.
(Determinations of chloride concentrations of ground water in fresh-water, diffused-water, and salt-water bodies are made on interstitial water extracted by the filter-press method from core samples. The filter-press extraction is simple, direct, and economical, and the results are consistent with those obtained by other methods.)

1961b Head and flow of ground water of variable density: Am. Geophys. Union, Jour. of Geophys. Research, v. 66, no. 12, p. 4247-4256.
(Variable-density water is studied by use of concepts of fresh-water head (fwh) and environmental-water head (ewh). Fwh defines hydraulic gradients along a horizontal. Ewh defines hydraulic gradients along a vertical. Components of velocity can be computed from gradients defined by fwh and ewh and from appropriate components of the permeability tensor. Equations for the component velocities are based on the Darcy equation. An equation based on the ewh is presented for defining specific limitations of the Ghyben-Herzberg and the Hubbert equations.)

LUSCZYNSKI, N. J.

1962 (and Swarzenski, W. V.) Fresh and salty ground water in Long Island, New York: Jour. of the Hydraulic Div., Am. Soc. Civil Eng. Proc., v. 88, no. HY4, p. 173-194, 5 figs., 1 table.
(Test drilling of 15 wells on Atlantic and Lido Beaches revealed salty water in the upper units of Late Cretaceous and Pleistocene age. Wells screened in the Lloyd Sand Member of the Raritan Formation have fresh water at the present time but the salty water is percolating downward through the overlying clay member of the Raritan Formation. Rate of this motion is not established.)

1966 (and Swarzenski, W. V.) Salt-water encroachment in southern Nassau and southeastern Queens Counties, Long Island, New York: U.S. Geol. Survey Water-Supply Paper 1613-F, 5 pls., 12 figs., 2 tables.
(Describes methods of determination and occurrence of salt water in ground water of southern Nassau and southeastern Queens Counties. Analysis includes direction and rate of fresh and salt waters, physical and hydraulic description of geologic units, and chemical quality.)

MacKICHAN, K. A.

1951 Estimated use of water in the United States, 1950: U.S. Geol. Survey Circ. 115, 6 figs., 13 p.
(Estimated use of ground water in the State is tabulated under rural, municipal, industrial, and irrigation classifications.)

1957 Estimated use of water in the United States, 1955: U.S. Geol. Survey Circ. 398, 18 p., 6 figs., 12 tables.
(Water use is broken into two categories: withdrawal use, and consumptive use. The users are divided into five groups: public supplies, rural, irrigation, self-supplied industrial, and water power. The uses and users are estimated in each State and in each geographic region.)

1961 (and Kammerer, J. C.) Estimated use of water in the United States: U.S. Geol. Survey Circ. 456, 44 p., 10 figs.
(The estimated average use of water in New York in 1960 was almost 14,000 mgd. Of this amount 650 mgd was taken from underground sources, almost half of which was used for public supplies.)

McELROY, SAMUEL

1893 Driven wells of Brooklyn: Am. Water Works Assoc. Proc., v. 13, 6 p., 2 figs.
(Discusses the source, reserves, and use of ground water in Brooklyn. A series of 2-inch casings were driven to depths up to 90 ft. These were connected to a pump which would pump several wells simultaneously.)

McGUINNESS, C. L.

1947 Recharge and depletion of ground-water supplies: Am. Soc. Civil Engineers Trans., v. 112, art. 2318, 27 p.
(Brief comment on artificial recharge through wells on western Long Island. The N.Y. Water Power and Control Comm. has the authority to require similar practices elsewhere on Long Island if necessary. Includes an appendix of 48 references.)

1951a The water situation in the United States with special reference to ground water: U.S. Geol. Survey Circ. 114, 127 p.
(The current ground-water situation, the deficiencies in information, and corrective measure and further development are discussed in tabular form under the subjects of New York City, public supply, northwestern area, "Upstate" New York, and Long Island.)

1951b Water law with special reference to ground water: U.S. Geol. Survey Circ. 117, 30 p.
(Includes brief summary in appendix of the New York water law with respect to the authority of the Water Power and Control Comm., mineral-water wells, wells on Long Island, and springs.)

MACK, F. K.

(See also Heath, R. C., 1963b)

1962 (and Digman, R. E.) The ground-water resources of Ontario County, New York: New York Water Resources Comm. Bull. GW-48, 99 p., 3 pl., 8 figs., 11 tables.
(Approximately 40,000 people in Ontario County obtain their water from ground-water sources. There are 5 major aquifers, 3 of which yield an average in excess of 20 gpm. These high-yield aquifers include unconsolidated stratified drift, a limestone aquifer, and a shale aquifer. The productive bedrock aquifers are Paleozoic in age and dip gently south. The lower three aquifers have dissolved solids in excess of 500 ppm, while the uppermost bedrock aquifer has 232 ppm. The unconsolidated deposits vary from 1 to 300 ft in thickness and yield two types of water: bicarbonate water with 389 ppm dissolved solids and hardness of 314 ppm, and sulfate water with 1,743 ppm dissolved solids and non-carbonate hardness of 1,305 ppm. This report includes 767 well records, 34 test holes, 49 spring records, 109 chemical analyses, and 169 drillers' logs.)

1964 (and Pauszek, F. H., and Crippen, J. R.) Geology and hydrology of the West Milton area, Saratoga County, New York:

MACK, F. K. (Cont'd.)
U.S. Geol. Survey Water-Supply Paper 1747, 110 p., 6 illus., 34 figs., 22 tables.
(The geology, ground-water conditions, streamflow characteristics, and quality of water in the West Milton area are described with special emphasis on the Knolls Atomic Power Laboratory well field. The laboratory draws 3 mgd from one horizontal well in a water-table aquifer near Kayaderosseras Creek and three vertical wells, screened in an artesian aquifer of a lower sand and gravel. Both aquifers are in the Kayaderosseras Creek valley and typify, geologically, the largest potential sources of ground water in the area.)

MARTIN, R. C.
1960 Water for New York: Syracuse, Syracuse Univ. Press, 264 p., 4 maps.
(Describes as of January 1, 1959, New York State administration of water resources. Lists state water-resources agencies, contains map of principal water-shed areas, and reviews the state's various sources of water-resources law.)

MASON, W. P.
1921 Damage to wells by sea water: Am. Water Works Assoc. Jour., v. 8, no. 1, p. 59-71, 3 figs., 10 tables.
(Contains tabular data on the increase of chlorides in wells on Long Island due to overpumpage. Included are analyses for hardness, nitrates, and total solids.)

MATHER, W. W.
1841 Mineral Springs: New York State Assem. Doc. 150, p. 108-111.
(Describes a sulfur spring, a nitrogen gas spring, and a chalybeate spring in Rensselaer County. Briefly mentions the springs at Saratoga Springs, Ballston, and Lebanon, New York.)

1843 Geology of the First Geological District, pt. I of Geology of Geology of New York: Nat. History of New York, pt. IV, N.Y. State Mus. of Nat. History, 653 p., 46 pl., 35 figs.
(Contains the results of the first systematic survey of the geology of the southeastern part of the state. Pages 79 to 123 are devoted to a discussion of mineral springs and wells, including those at Saratoga Springs, Ballston Spa, and Albany; springs yielding water containing hydrogen sulfide; springs yielding water containing iron carbonate (chalybeate springs); thermal springs; and deposits laid down by springs and percolating ground waters. Contains analyses of water from the Congress Spring (at Saratoga Springs), United States Spring (at Ballston Spa), mineral well at Albany, and thermal spring (at New Lebanon). The mineral well at Albany was drilled to a depth of about 600 ft in search of fresh water. At a depth of 250 ft the well yielded flammable gas. At a depth of 480 ft the well

MATHER, W. W. (Cont'd.)
yielded, in addition to flammable gas, saline water containing hydrogen sulfide and carbon dioxide. The water containing hydrogen sulfide apparently entered the well about 30 ft below the surface.
The temperature of the New Lebanon gaseous and thermal spring is 73°F compared with 52°F for other springs in the area. The gas given off by the spring consists of about 90 percent nitrogen and 10 percent oxygen.
Brief mention is made of limestone caverns and springs.)

MATTINGLY, A. L.
1961 Chemical and physical quality of water resources in the St. Lawrence River basin, New York State: New York State Dept. of Commerce Bull. 4, p. 7-11, 85-90, 4 pl., 10 figs.
(A few chemical analyses of ground water from wells in the St. Lawrence River basin show that water from limestone and dolomite generally has higher hardness and higher dissolved solids than water from sandstones and some other geologic formations.)

MEINZER, O. E. (See also Waring, G. A., 1947)
1918 Bibliography and index of the publications of the United States Geological Survey relating to ground water: U.S. Geol. Survey Water-Supply Paper 427, 169 p.
(References are annotated.)

1923 The occurrence of ground water in the United States: U.S. Geol. Survey Water-Supply Paper 489, 321 p., 31 pl., 110 figs.
(Contains geologic sections of the rock systems found in New York. Discusses briefly the water-bearing characteristics of the formations and how they are affected by faulting, jointing, and other structural features.)

1938 The importance of underground water: Water Works Eng., v. 91, no. 18, p. 1142.
(The draft of ground water from drift and Cretaceous Sand on Long Island is depicted in two figs. and described in a brief paragraph.)

MERRILL, F. J. H.
1895 Mineral waters: New York Mus. Bull. 15, p. 561-578.
(Lists the known mineral springs and wells of New York with analyses for 79 of the larger springs and wells. Contains temperature measurements and well yields for a few springs and wells.)

1898 Mineral waters: New York State Mus. Bull. 19, p. 229-231.
(Lists 36 mineral springs in New York which are commercially productive.)

MERRILL, F. J. H.

1902 (and Darton, N. H., Hollick, Arthur, Salisbury, R. D., Dodge, R. E., Willis, Bailey, and Presley, H. A.) Geologic atlas of the United States, New York City folio: U.S. Geol. Survey Geol. Atlas, Folio 83, 19 p., 13 pl., 24 figs.
(Briefly reviews the history of the New York City water supply and the studies that were being made in the early 1900's to increase the supply. The folio covers the four 15-minute quadrangles of Paterson, Harlem, Staten Island, and Brooklyn.)

MILMOE, WHEELER

1956 Water, water everywhere, but ----: New York State Conservationist, v. 11, no. 2, 2 p.
(Briefly discusses the work of legislative committees in the field of water resources.)

MOZOLA, A. J.

1951 The ground-water resources of Seneca County, New York: New York Water Power and Control Comm. Bull. GW-26, 57 p., 4 pl., 5 figs.
(Four distinct aquifers are present: (1) the Camillus Shale Member of the Salina Formation, (2) a limestone sequence (Bertie Limestone Member of the Salina Formation up through the Onondaga Limestone), (3) Devonian Shale and interbedded sandstone, and (4) glacial and alluvial deposits. Buried valleys that are mapped indicate the northward extension of the bedrock valleys of both Seneca and Cayuga Lakes. Water in the valley fill is not potable everywhere, owing to a high chloride content.
Data for the 330-sq mi county include 307 well and 18 spring records, 40 well logs, and 42 chemical analyses. Illustrations include 2 geologic cross sections and maps (scale 1:125,000) showing the bedrock surface and bedrock geology.)

NEWLAND, D. H.

1906 The mining and quarry industry of New York State: New York State Mus. Bull. 102, 199 p.
(Briefly describes the mineral springs of New York.)

1909 The mining and quarry industry of New York State: New York State Mus. Bull. 132, p. 40-45.
(Describes the types of mineral springs of New York and gives the names and locations of some of the larger ones. Contains chemical analyses for three springs.)

1910a The mining and quarry industry of New York State: New York State Mus. Bull. 142, p. 53-57.
(Briefly describes the types of mineral springs in New York. Lists the names and localities of some of the larger springs.)

NEWLAND, D. H.

1910b The mining and quarry industry of New York State: New York State Mus. Bull. 151, p. 40-44.
(Describes the types of mineral springs in New York. Lists the names and locations of some of the larger springs.)

1911 The mining and quarry industry of New York State: New York State Mus. Bull. 161, p. 42-45.
(Describes the types of mineral water found in New York. Lists names and locations of some of the larger springs.)

1912 The mining and quarry industry of New York State: New York State Mus. Bull. 166, p. 40-44.
(Describes the types of mineral waters found in New York. Lists names and locations of some of the larger springs.)

1913 The mining and quarry industry of New York State: New York State Mus. Bull. 174, p. 51-55.
(Describes the types of mineral waters found in New York. Lists names and locations of some of the larger springs.)

1915 The mining and quarry industry of New York State: New York State Mus. Bull. 178, p. 42-44.
(Describes the types of mineral waters found in New York. Lists names and locations of some of the larger springs.)

1918 The mining and quarry industry of New York State, in Clarke, J. M., Thirteenth report of the director of the State Museum and Science Department: New York State Mus. Bull. 196, p. 271-274.
(Describes the types of mineral water found in New York. Lists names and locations of some of the large springs.)

1921 The mineral resources of the State of New York: New York State Mus. Bull. 223-224, p. 158-162.
(Briefly describes the mineral water found in New York. Contains names and locations of some of the larger wells.)

1928 (and Hartnagel, C. A.) The mining and quarry industries of New York for 1925 and 1926: New York State Mus. Bull. 277, p. 66-68.
(Describes the importance of mineral-water sales to the economy of New York. Briefly mentions the more common ingredients of the mineral waters.)

1936 (and Hartnagel, C. A.) The mining and quarry industries of New York State for 1930 to 1933: New York State Mus. Bull. 305, p. 56-58, 68-69.
(Briefly mentions the types, varieties, and uses of mineral springs in New York. Describes a few of the saline springs occurring in western New York.)

NEWLAND, D. H.
1939 (and Hartnagel, C. A.) The mining and quarry industries of New York State for 1934 to 1936: p. 64-65.
(The principal chemical ingredients of the mineral waters of New York are compounds of sodium, potassium, calcium, and magnesium. These are usually combined with chlorine, carbon dioxide, or sulfuric acid.)

NEW YORK STATE COMMISSION ON NORTHWESTERN NEW YORK WATER SUPPLY
1949a Fact-finding survey for Genesee County, New York, for State Commission on Northwestern New York Water Supply: Rept. of Board of Consulting Engineers, app. 5-8.
(Discusses the use of ground water in many small towns in western New York. Contains tabular data comparing cost of surface water versus ground water.)

1949b A report on investigation of water-supply sources in Wayne, Ontario, Yates, Schuyler, and Seneca Counties for State Commission on Northwestern New York Water Supply: Rept. of Board of Consulting Engineers, app. 9-16.
(Ground water as a primary source for large, municipal water supplies appears to be impractical as yield of individual wells are low and the water is extremely hard. Small villages and individual industries use ground water as primary water supplies because the initial cost of installation is less than for a surface-water supply. Several wells in the Irondo-Genessee Valley, near Rochester, yield 800 gpm from stratified drift.)

NEW YORK STATE DEPARTMENT OF COMMERCE
1950 Ample water, a key to New York State's greatness: New York State Dept. of Commerce, p. 7-11.
(Discusses the ground-water resources of New York State, and compares yields from bedrock and unconsolidated deposits.)

NEW YORK STATE DEPARTMENT OF HEALTH
1929 Descriptive data of public water supplies in New York State: New York State Dept. of Health, Div. of Sanitation.
(Contains data as to the source, treatment, consumption, storage facilities, watershed rules, hardness and alkalinity, owner, population served, percentage of services metered, and whether pumped or gravity flow for public water supplies.)

1940 Descriptive data of public water supplies in New York State: New York State Dept. of Health, Div. of Sanitation.
(Contains data as to the source, treatment, consumption, storage facilities, watershed rules, hardness and alkalinity, owner, population served, percentage of services metered, and whether pumped or gravity flow for public water supplies.)

NEW YORK STATE DEPARTMENT OF HEALTH

1942a Protection and chlorination of public water supplies: New York State Dept. of Health, Div. of Sanitation, Bull. 21, p. 11-22.
(Discusses the source and use of water in public and private water supplies in New York. Describes methods of construction of wells and of horizontal infiltration galleries with cross sections showing how and where each might be used to bhe best advantage.)

1942b The sanitary code: New York State Public Health Council, 3 p.
(Contains regulations on definitions, plans, and changes in public supplies with intent to indicate what is permissible and what is not.)

1948 Public water supply data: Bur. of Environmental Sanitation, Bull. 19.
(Contains data on the source, treatment, consumption, storage facilities, watershed rules, hardness and alkalinity (in ppm), owner, population served, percent of services metered, and whether pumped or gravity flow for public water supplies.)

1954 Public water supply data: Bur. of Environmental Sanitation, Bull. 19, 44 p.
(Contains data on the source, treatment, consumption, storage facilities, watershed rules, hardness and alkalinity (in ppm), owner, population served, percent of services metered, and whether pumped or gravity flow for public water supplies.)

1955 Ground-water supplies: Water Works News of New York State, v. 10, no. 3, Sept.
(Discusses dug, driven, and drilled wells with a brief mention of seeps and springs.)

1958 Determination of barium and strontium content of selected public water supplies: Water Works News of New York State, v. 13, no. 3, Sept.
(Contains data on 103 public water supplies with analyses for total solids, barium, strontium, calcium, and magnesium.)

1960 Public water supply data: Bur. of Environmental Sanitation, Bull. 19, 186 p.
(Contains data on the source, treatment, consumption, storage facilities, watershed rules, hardness and alkalinity (in ppm), owner, population served, percent of services metered, and whether pumped or gravity flow for public water supplies.)

NEW YORK STATE JOINT LEGISLATIVE COMMITTEE TO INVESTIGATE POTABLE WATER RESOURCES

1933 Laws of New York State relating to the control of water supply: New York State Legislative Doc., no. 110, exhibit no. 1, p. 35-203.
(Brings together the State laws relating to the development of water supplies.)

NEW YORK STATE JOINT LEGISLATIVE COMMITTEE ON NATURAL RESOURCES

1952 Report of the New York State Joint Committee on Natural Resources: New York State Legislative Doc., no. 77, 116 p.
(The importance of water to the development of the State is outlined. Ground-water supplies in the State number 479 and serve a total of 1,749,315 people in 664 communities. Conserved and wisely used New York State's ground and surface sources should be adequate for expanded needs. The Water Power and Control Comm. regulates construction of wells on Long Island. Regulation has resulted in substantial recovery of water level or a reduction in the rate of decline. The limits of the Commission's control are described. The Commission's cooperative program with the U.S. Geol. Survey is also described.)

1953 Report of the New York State Joint Committee on Natural Resources: New York State Legislative Doc., no. 69, 146 p.
(In a limited number of areas where ground water is plentiful it may be useful for emergency irrigation purposes. Water has been divided into three classes for irrigation purposes. All classes including percolating waters (the third class, or ground water) is currently being used in the State. Several cases of litigation are outlined. The laws of New York State do not clearly define irrigation rights.)

1955 Report of the New York State Joint Committee on Natural Resources: New York State Legislative Doc., no. 76, 285 p.
(Discusses the importance and availability of water in New York State. Of 876 public water supplies, 479 take water from underground sources and 43 tap both surface and underground sources. No clear inventory of farm-water supplies is available. Absence of treatment and disinfection facilities has resulted in a preponderance of farm use of ground-water supplies. The increasing industrial need for water is described. The control of water resources on Long Island by the Water Power and Control Comm. is mentioned. State committees dealing with water problems are listed. Water rights and a water code are described.)

1956 Report of the New York State Joint Committee on Natural Resources: New York State Legislative Doc., no. 63, 294 p.
(The report summarizes trends and developments in, and

NEW YORK STATE JOINT LEGISLATIVE COMMITTEE ON NATURAL RESOURCES (Cont'd.)

5 years of study on, water resources and water rights. State agencies are listed that are concerned with water-resources utilization and conservation. The committee outlines a "program of action" on water resources. Laws of the State, as they relate to the use of water for irrigation, were studied and found to be unclear.)

1957 Report of the New York State Joint Committee on Natural Resources: New York State Legislative Doc., no. 43, 201 p.

(Discusses the legislative approach to New York State's natural resources problem, legislative progress, and developments in improving forests, soil and watershed conservation, studies in water resources and water rights, control of air pollution, and recommendations of the committee. Sub-committee water resources studies include (1) needs of municipalities, industries, agriculture and recreational facilities, (2) hydrologic factors and, (3) legal factors.)

1958 Report of the New York State Joint Legislative Committee on Natural Resources: New York State Legislative Doc., no. 28, 42 p.

(The following aspects of water resources are discussed: (1) municipal water needs, (2) industrial water needs, (3) agricultural water needs, (4) recreational uses of water, (5) hydrologic factors, and (6) the legal factors in water rights. It was concluded that (1) the State's water requirements will increase in the future, (2) floods and droughts must be prevented, (3) conservation and pollution control are essential parts of an effective program of development, and (4) there is a need for a study of the long-range needs for water.)

1959 Report of the New York State Joint Committee on Natural Resources: New York State Legislative Doc., no. 22, 276 p.

(The extent of the State's water resources are briefly described. The needs of this resource in future years are briefly listed as in previous reports of this committee.)

NEW YORK STATE TEMPORARY COMMISSION ON IRRIGATION

1956 Report of the New York State Temporary State Commission on Irrigation: New York State Legislative Doc., no. 29, 61 p.

(Describes the first year of the commission's work in studying the practicability of the use of irrigation projects as a means of expanding and stabilizing the agricultural economy of New York. One of the sources of irrigation water is ground water, developed chiefly on Long Island. Since the quantity of available ground water is undetermined, the rights to that which is available are not clear. Drilled wells capable of producing a few hundred gallons per minute are common only on Long Island.)

NEW YORK STATE TEMPORARY COMMISSION ON IRRIGATION

1957 Report of the New York State Temporary State Commission on Irrigation: New York State Legislative Doc., no. 27, 119 p.
(Fifty-five percent of the total cropland harvested in Suffolk County, Long Island, is irrigated from an abundant ground-water supply. The position and characteristics of the fresh-water lens overlying salty water on Long Island and the possibilities of salt-water encroachment along its margins are briefly described. Ground-water supplies in most upstate areas are inadequate for the volumes required for irrigation. Irrigation "upstate" has increased most rapidly in the low rainfall area from Rochester to Buffalo and south along Lake Erie. However, ground-water supplies here are particularly meager. The function of studying the occurrence, movement, quantity, and quality of ground water is briefly described.)

1958 Report of the Temporary Commission on Irrigation: New York State Legislative Doc., no. 33, 118 p.
(Briefly summarizes history of irrigation on Long Island. Other subjects discussed are: (1) the Long Island water supply, (2) the need for additional research, (3) use of the Barge Canal for water, and (4) legal questions regarding use of water for irrigation.)

1959 Report of the New York State Temporary Commission on Irrigation: New York State Legislative Doc., no. 27.
(In "upstate" areas ground-water supplies may be usable for irrigation purposes but have not been adequately investigated. The cooperative investigation program of the U.S. Geol. Survey and State agencies is briefly mentioned.)

NEW YORK STATE TEMPORARY COMMISSION ON WATER RESOURCES PLANNING

1960 Dynamic planning, first step in water-resources development for New York State: New York State Legislative Doc., no. 24.
(A progress report of the Water Resources Planning Comm. Discusses the future water needs of the State, and the legislation needed to promote the orderly development of the water resources. Contains proceedings of the state-wide conference and workshops on water-resources planning and development.)

1962 Legislative guidelines: Twelve ways to meet the water resources needs of the Empire State: Progress Rept. of the Temporary State Comm. on Water Resources Plan., 187 p.
(A progress report of the Water Resources Planning Comm. States and discusses general guidelines to be used by legislative bodies involved in legislation concerning water resources. Contains a preliminary report on the Genesee River basin, memberships of several sub-committees and some recent legislation concerning water resources.)

NEW YORK STATE WATER POLLUTION CONTROL BOARD
1955 Newton Creek drainage basin, surface and ground waters: New York State Water Pollution Control Board, Chemung River drainage basin ser., rept. no. 1, 43 p., 3 maps, 3 figs.
(Ground water in the Newton Creek drainage basin is classified (1) by areas delineated by streets, village limits, or city boundaries, (2) by character of district such as woodland, field, or residential area, and (3) by present type of use. The city of Elmira and the village of Elmira Heights are supplied by ground-water tables which list the 9 wells from which samples are taken and 4 pages of chemical analyses of ground water.
Two figures show (1) the location of the nine wells with respect to Newton Creek and the Chemung River, and (2) the above-mentioned areas of ground-water classification in the basin.)

NEW YORK STATE WATER POWER AND CONTROL COMMISSION
1958 Record of wells in Nassau County, New York, Supp. 2: New York Water Power and Control Comm. Bull. GW-39, 308 p., 1 pl.
(The report contains logs of 676 wells, the results of pumping tests for most of the wells, and a well-location map. Supplements records published in U.S. Geol. Survey Prof. Paper 44, and N.Y. Water Power and Control Bulls. GW-5 and GW-10.)

NORCOM, G. D.
1938 The quality of underground waters of Long Island, New York: Am. Water Works Assoc. Jour., v. 30, p. 302-323.
(Discusses the variations in the quality of ground water on Long Island. The deeper wells are higher in iron and chlorides while the shallower wells appear to be higher in total solids.)

NORTH, M. L.
1843 Saratoga waters: New York, Saxton and Miles, 72 p.
(Contains chemical analyses for five springs at Saratoga Springs and one each in Livingston and Schoharie Counties.)

O'BRIAN, D. T.
(See Slater, F. J., 1932)

O'BRYAN, DERIC
(See Barksdale, H. C., 1966)

OUTLAW, D. E.
1953 A geologic and hydrologic study of Shackham watershed, New York State: U.S. Geol. Survey, open-file report.
(Ground water is obtained almost entirely from Pleistocene deposits in the area. Small amounts of water flow through joints and bedding planes and other openings in the bedrock formations. The discharge of ground water at Shackham watershed was 92 percent of the total discharge of Shackham Brook during a 30-day period.)

PARKER, G. G.
1964 (and others) Water resources of the Delaware River basin: U.S. Geol. Survey Prof. Paper 381, 200 p., 12 pls., 75 figs., 48 tables.
(An analysis of the entire Delaware River basin pertaining to its geology, topography, surface water, water quality, ground water, and atmospheric water with the relations between each and with man. Develops water budget of basin and of both "hard rock" and "soft rock" areas. Includes ground-water resources of New York State portion of basin with reference to occurrence in quantity and quality.)

PARKHURST, E.
(See Gentry, J. T., 1959)

PAUSZEK, F. H.
(See also Halberg, H. N., 1962, 1964)

(See also Mack, F. K., 1964)

1956 Chemical quality of water resources in the Allegheny River and Chemung River basins, New York, 1953-1954: New York Dept. of Commerce mimeo. rept., 44 p.
(Contains records of 12 wells and chemical analyses of the water from each well.)

PEALE, A. C.
1886 Mineral springs of the United States: U.S. Geol. Survey Bull. 32, p. 27-41.
(Contains a list of about 350 mineral springs and wells in New York and 93 chemical analyses.)

1893 Natural mineral waters of the United States: 14th Ann. Rept. of the U.S. Geol. Survey, Pt. II.
(Lists mineral springs in United States; includes table of discharge; discusses origin of minerals and uses.)

PELON, G.
1948 Acid treatment of wells at Indian Lake Water District No. 2: Water Works News of New York State, v. 3, no. 2, 1948.
(Acid treatment of five wells at Indian Lake restored the initial yields of most wells and in one case the yield was increased. Encrustations on the screen were broken down or dissolved with no damage to the screen itself.)

PEPPER, J. F.
(See Bradley, W. H., 1938)

PERLMUTTER, N. M.
(See also Lieber, Maxim, 1964)

(See also Suter, Russell, 1949)

PERLMUTTER, N. M.

1953 (and Arnow, Theodore) Ground water in Bronx, New York, and Richmond Counties, with summary data on Kings and Queens Counties, New York City, New York: New York Water Power and Control Comm. Bull. GW-32, 86 p., 5 pl., 11 figs.

(Ground water represents only about 8 to 13 percent of the more than 1,000 mgd of water consumed daily in New York City. In Bronx, New York, and Richmond Counties most ground water is obtained from Pleistocene sand and gravel. The most productive bedrock aquifer is the Inwood Limestone in Bronx County. The Manhattan Schist underlying New York County yields a little water.
Data for the 145-sq mi area include 240 well records, 82 well logs, 69 chemical analyses, and 5 cross sections. Maps show the bedrock surface of New York County (scale about 1:96,000), the pre-Pleistocene formations in New York City (scale: 1:125,000), and the Pleistocene deposits in New York City (scale: 1:125,000), all adapted from existing sources.)

1959a Geology and ground-water resources of Rockland County, New York: New York Water Power and Control Comm. Bull. GW-42, 133 p., 4 pl., 6 figs.

(Ground-water supply is more than adequate to meet present demands. Principal aquifers are the Newark Group and stratified drift. The water is moderately hard, low in iron content and slightly alkaline. Contains data on average daily use, water-table fluctuation, 99 well logs, and records of about 540 wells and test holes.)

1959b (and Crandell, H. C.) Geology and ground-water supplies of the south-shore beaches of Long Island, New York: New York Acad. of Sci. Annals, v. 80, art. 4, p. 1060-1076, 6 figs., 3 tables.

(Pleistocene and Cretaceous Formations are the sources of ground water on the south-shore beaches. An average of 7 mgd is pumped from wells and has caused local salt-water encroachment. Data include analyses of 12 water samples and 6 geologic sections.)

1959c (and Geraghty, J. J., and Upson, J. E.) The relation between fresh and salty ground water in southern Nassau and south-eastern Queens Counties, Long Island, New York: Econ. Geology, v. 54, p. 416-435, 7 figs.

("Salty" ground water containing chloride concentrations ranging from 40 ppm to 18,000 ppm occurs seaward of fresh water in the Jameco Gravel and Magothy (?) Formation and in the Pleistocene deposits above the Gardiners Clay. Although the chloride content of a few wells have shown a progressive increase there is no evidence of large-scale encroachment. A formula for finding the depth to the fresh water-salt water interface is given which takes into

PERLMUTTER, N. M. (Cont'd.)

account the head of the salt water in addition to fresh-water head and the densities of the fresh water and salt water. The depth to the fresh water-salt water interface cannot be determined using the Ghyben-Herzberg relationship.)

1960 Sources of ground water in southeastern New York: U.S. Geol. Survey Circ. 417, 9 p., 1 fig., 1 table.

(This report summarizes the ground-water situation in six counties of southeastern New York excluding New York City and Long Island. The six counties are: Dutchess, Orange, Putnam, Rockland, Ulster, and Westchester. Describes the water-bearing characteristics of the unconsolidated and consolidated deposits, and estimates the average daily consumption of ground water. Contains data on 38 wells showing the water-bearing formation, depth, location and chemical analyses.)

1963a (and Geraghty, J. J.) Geology and ground-water conditions in southern Nassau and southeastern Queens Counties, Long Island, New York: U.S. Geol. Survey Water-Supply Paper 1613-A, 205 p., 7 illus., 21 figs., 13 tables.

(The report delineates bodies of fresh and salt water in three principal aquifers in the area. From the surface down, the aquifers are the water-table aquifer consisting of Pleistocene gravels and sands, the artesian aquifer in the Magothy (?) Formation and Jameco Gravels, and the artesian aquifer in the Lloyd Sand Member of the Raritan Formation.

The history of ground-water development is discussed in its relation to encroachment of salt water into the aquifers. The problems of prediction of rates and amounts of salt water intrusion are evaluated.)

1963b (and DeLuca, F. A.) Availability of fresh ground water, Montauk Point area, Suffolk County, Long Island, New York: U.S. Geol. Survey Water-Supply Paper 1613-B, 39 p., 2 illus., 9 figs., 7 tables.

(The availability of ground-water supplies in the Montauk Point area is described. An artesian aquifer contains fresh water in a lens lying on salt water. Pumping rates in excess of 50 gpm from individual wells in this aquifer cause the salt water to rise in the vicinity of the pumping wells. Suggestion as to safe yields and well patterns are made in regard to the prevention of salt-water intrusion in the aquifer.)

PERLMUTTER, N. M.

1963c (and Lieber, Maxim, and Frauenthal, H. L.) Movement of waterborne cadmium and hexavalent chromium wastes in South Farmingdale, Nassau County, Long Island, New York: U.S. Geol. Survey Prof. Paper 475-C, art. 105, 6 p., 4 figs.
(Describes the movement of a slug of contaminated water discharged by a plating plant through the water-table aquifer in Nassau County. The slug has been mapped four times since measures were taken in 1949 to reduce or eliminate the influx of more contaminants. The slug has moved beneath and beyond a stream and reaches a depth of about 50 ft. Its horizontal extent is 1,000 ft wide and 4,200 ft long.)

1963d (and Soren, Julian) Effects of major water-table changes in Kings and Queens Counties, New York City: U.S. Geol. Survey Prof. Paper 450-E, art. 219, 4 p., 1 fig., 1 table.
(This report briefly relates the history of water usage, water-table fluctuations, and salt-water encroachment in the water-table aquifer in Kings and Queens Counties, Long Island. Recommendations are made in regard to safe pumpage limits in the two counties to prevent further salt-water encroachment.)

1964 (and Lieber, Maxim, and Frauenthal, H. L.) Contamination of ground water by detergents in a suburban environment, South Farmingdale area, Long Island, New York: U.S. Geol. Survey Prof. Paper 501-C, p. 170-175, 4 figs.
(Water in the upper 20 ft of the water-table aquifer, composed of glacial outwash deposits, is contaminated by ABS in concentrations generally between 1 and 5 ppm but locally as high as 32 ppm. Most of the water in the remainder of the aquifer contains less than 1 ppm and does not foam. Effluent from hundreds of randomly distributed cesspools is the source of contamination.)

PETERS, J. H.

(See also Stevens, D. B., 1966)

1965 (and Stevens, D. B.) Long Island recharge studies: 38th Ann. Conf. of the Water Pollution Control Federation, Atlantic City, New Jersey, Oct. 10-14, 1965.
(Describes research undertaken to treat municipal waste water that can be recharged to the ground via wells.)

1967 (and Cuming, Donald) Water conservation by barrier injection: Water Sewage Works, v. 114, no. 2, p. 63.
(Account of an investigation into the ground-water supply on Long Island, New York. Describes the method of pumping fresh water into the ground to prevent underground contamination by salt water from the ocean. Shows figures of well construction.)

PHALEN, W. C.
1911 The occurrence of potash salts in the bitterns of the eastern United States: U.S. Geol. Survey Bull. 530, p. 313-329.
(The salt beds of New York occur almost entirely in the Salina Formation of the Silurian System. The salt is usually found from 550 ft to 750 ft below the surface. This report contains analyses of six brine wells in western New York for sodium, potassium, calcium, magnesium, chlorine, and sulfate.)

1919 Salt resources of the United States: U.S. Geol. Survey Bull. 669, 284 p., 17 pl.
(The Salina Formation crops out in the central lowlands of New York State. The outcrop belt is continuous from the Niagara River to a point near Schoharie in eastern New York. In this outcrop area there are numerous saline wells.)

PIPER, A. M.
1960 Interpretation and current status of ground-water rights: U.S. Geol. Survey Circ. 432, p. 3.
(The regulation of competitions for limited supplies of ground water, except for agricultural and municipal uses, is practiced on Long Island to control the intrusion of sea water. Wells having a capacity of less than 45 gpm are exempted.)

PIRNIE, MALCOLM
1947 (and Sawyer, R. M.) Ground water - a neglected natural resource: Am. Water Works Assoc. Jour., v. 39, no. 10, Oct., p. 968-978.
(Briefly describes the history of the development of the water supply of the city of Schenectady from sand and gravel deposits adjacent to the Mohawk River, northwest of the city.)

PLUHOWSKI, E. J.
1961 Variation in temperature of two streams on Long Island, New York: U.S. Geol. Survey Prof. Paper 424-D, art. 314, 4 p., 4 figs.
(This report describes the effect of ground-water inflow on stream temperatures. Two streams on Long Island were chosen for the test, and air, ground water, and stream temperatures were recorded along each stream. In addition discharge measurements were taken to assure the amount of ground-water contribution to the streamflow.)

PLUHOWSKI, E. J.

1962 (and Kantrowitz, I. H.) Source of ground-water runoff at Champlin Creek, Long Island, New York: U.S. Geol. Survey Prof. Paper 450-B, art. 38, 3 p., 3 figs.

(This report describes the relationship between the ground-water table and streamflow along Champlin Creek in Suffolk County, Long Island. Increases in the slope of the ground-water table are interpreted as accounting for increased baseflow along the central part of the stream.)

1963 (and Kantrowitz, I. H.) Influence of land-surface conditions on ground-water temperatures in southwestern Suffolk County, Long Island, New York: U.S. Geol. Survey Prof. Paper 475-B, art. 51, 3 p., 1 fig.

(Variation in absorbed solar radiation among differing surface environments in southwestern Long Island, New York, results in lower ground-water temperature under wooded areas than under cleared areas. Shale and a layer of organic material on the ground account for the lesser amount of solar radiation absorbed in the wooded area.)

1964 (and Kantrowitz, I. H.) Hydrology of the Babylon-Islip area, Suffolk County, Long Island, New York: U.S. Geol. Survey Water-Supply Paper 1768, 119 p., 8 illus., 28 figs., 9 tables.

(This report describes the geology and ground-water conditions of the area. Three aquifers are evaluated. From the surface, the aquifers include Pleistocene sands and gravels, sands of the Magothy (?) Formation, and the Lloyd Sand Member of the Raritan Formation. The latter two aquifers are artesian. The present water budget is described and possible future problems of contamination and sewerage development are discussed.)

POMEROY, R. W.

1958 Water, water everywhere ---- but we need to stop and think: New York State Conservationist, v. 12, no. 5, 3 p.

(The legal status of water utilization is discussed with respect to (1) the common law doctrine of riparian rights, (2) the doctrine of prior appropriation, (3) the State Constitution, (4) acts of the Legislature, (5) administrative regulations, and (6) interstate compacts.)

POOLE, J. L. (See Krieger, R. A., 1957)

PRESIDENT'S WATER-RESOURCES POLICY COMMISSION

1950a A water policy for the American people: U.S. Govt. Printing Office, 445 p.

(Volume 1 of 3-volume report of the President's Water-Resources Policy Comm. Information pertaining to the water resources of New York and the adequacy of hydrologic data is integrated with data for the nation as a whole.)

PRESIDENT'S WATER-RESOURCES POLICY COMMISSION
1950b Water-resources law: U.S. Govt. Printing Office, 777 p.
(Volume 3 of the Report of the President's Water-Resources Policy Comm. Describes the law relating to development and control of water resources. Laws of New York, particularly these pertaining to the Delaware River basin, are discussed on p. 467-471.)

PRESLEY, H. A.
(See Merrill, F. J. H., 1902)

RAFTER, G. W.
1899 Water resources of the State of New York, Part II: U.S. Geol. Survey Water-Supply Paper 25, p. 105-200, 12 pl.
(Discusses chiefly water storage and power and canal projects, but also contains data in regard to seepage from canals (p. 159-160, 173-178), and quantities of water yielded by the sand deposits of Long Island (p. 191-198). Loss of water through seepage, evaporation, and transpiration from the early canals, including the Erie Canal, was found to range from about 1.5 cfs to about 2 cfs per sq mi.)

1905 Hydrology of the State of New York: New York State Mus. Bull. 85, 902 p., 49 pl., 74 figs.
(Contains a comprehensive discussion of the surface-water resources of New York. Ground water is discussed primarily from the standpoint of its effect on streams except for brief discussions of the development of ground water for water supplies.)

RECK, C. W.
1952 (and Simmons, E. T.) Water resources of the Buffalo-Niagara Falls region: U.S. Geol. Survey Circ. 173, 26 p., 1 pl., 22 figs.
(Contains tabular data on yields of wells finished in the various bedrock and unconsolidated formations. Compares chemical analyses of water from the different bedrock formations. Briefly mentions the water laws of New York.)

RICKETTS, A. T.
1930 The water supply of Flatbush, New York: Am. Water Works Assoc. Jour., v. 22, no. 1, p. 49-57, 4 figs.
(Discusses the initial organization of the water company and the problems confronting the present owners. The increasing population of western Long Island necessitated drilling new and deeper wells. The greater demand for ground water increased the hazard of salt-water encroachment.)

RIDDICK, T. M.

1958 (and Lindsay, N. L., and Tomassi, Antonio) Iron and manganese in water supplies: Am. Water Works Assoc. Jour., v. 50, no. 5, p. 688-696, 1 fig.

(Describes the appearance once or twice a year of as much as 5 ppm of manganese in the Hackensack River at Nyack, N.Y. Studies show that the manganese appears during the first flood in July or August after the temperature of the river reaches or exceeds about 76°F. Although the appearance of the manganese seems to be triggered by the increase in discharge and temperature, it is not known whether its presence is due to biological, chemical, or biochemical reactions. The paper also briefly describes abnormally high contents of iron in water from wells in Westchester County and Queens County.)

ROBERTS, C. M.

1945 (and Brashears, M. L., Jr.) Record of wells in Suffolk County, N.Y., Supplement 1: New York Water Power and Control Comm. Bull. GW-9, 155 p.

(Contains records of about 400 wells in Suffolk County in addition to those published in U.S. Geol. Survey Prof. Paper 44 and the New York Water Power and Control Comm. Bull. GW-4. Includes map showing locations of wells.)

1946 (and Brashears, M. L., Jr.) Record of wells in Nassau County, N.Y., Supplement 1: New York Water Power and Control Comm. Bull. GW-10, 191 p.

(Contains records of many wells in the county in addition to those published in U.S. Geol. Survey Prof. Paper 44 and New York Water Power and Control Comm. Bull. GW-5, with data on the ground-water levels. Includes map showing locations of wells.)

1947 (and Jaster, M. C.) Record of wells in Queens County, New York, Supplement 1: New York Water Power and Control Comm. Bull. GW-11, 123 p., 1 pl.

(Contains logs for 160 wells.)

1949 Ground-water levels and chloride-content data for the townships of Riverhead and Southold, Suffolk County, New York: U.S. Geol. Survey duplicated rept., 4 p., 2 tables.

(Contains tabular data on the chloride content of 197 wells and the variation observed during a 4-year period from 1945 through 1948. pH determinations were made for some wells in 1948. The data include a hydrograph showing the fluctuation of ground-water levels in nine observation wells, tables listing the chloride content of well water and maps showing the locations of wells in Riverhead and Southold townships.)

ROMER, HAROLD

1965 (and De Zuane, John, and Schaible, G. J., Jr.) Emergency water supplies for New York City: Am. Water Works Assoc. Jour., v. 57, no. 9, p. 1099-1115.

(Discusses the possibility of using local available ground water as a source of supply during periods of serious emergency. A survey of existing wells in New York City for bacterial quality and chloride concentration was conducted. A logistical survey of distribution capacity, etc., was also conducted and compiled on maps. Makes proposals to improve logistic problems. Map of city-owned aquifers included.)

RUEDEMANN, RUDOLF

(See Cushing, H. P., 1910, 1914)

(See Goldring, Winifred, 1937)

RUGGLES, F. H., JR. (See Simpson, E. S., 1959)

SALISBURY, R. D.

(See Darton, N. H., 1908)

(See Merrill, F. J. H., 1902)

SALVAS, E. H.

(See Heath, R. C., 1961)

(See Trainer, F. W., 1962)

SAMBERG, H. A.

(See Slater, F. J., 1932)

SANBORN, J. F.

(See also Berkey, C. P., 1923)

1920 (and Zipser, M. E.) Grouting operatings, Catskill water supply: Am. Soc. Civil Engineers Proc., v. 46, 12 figs., 80 p.

(Grout was used extensively in the tunnel sections of the Catskill Aqueduct to shut off flow of ground water from fissures. The tunnel depths vary from 100 ft to 1,100 ft, the latter being the depth at the Hudson River crossing where the ground-water head is 1,500 ft. In the "dry" stretches of the tunnel, inward leakage in no cases exceeded 150 gpm/mi of tunnel. In the 18 miles of the City Tunnel the maximum inward leakage was 137 gpm/mi. In many cases inward leakage during excavation gradually diminished and often stopped after some interval. In the "wet stretch" (Rondout Tunnel) individual zones, yielding up to 600 gpm, were penetrated in the faulted and crushed zones of the High Falls Shale and Binnewater Sandstone. The total inflow from a 350-ft stretch of tunnel 450 ft below ground surface diminished from about 2,000 gpm to 850 gpm and remained nearly constant until grouted. The

SANBORN, J. F. (Cont'd.)

grout reduced the inward leakage to 3 gpm. The Hudson River Shale was penetrated at 350 to 450 ft below land surface and was generally dry. (Maximum inward leakage in the Wallkill Pressure Tunnel was 90 gpm for 1,000 ft of tunnel; the shale was wetter than gneiss but there were no concentrated flows anywhere.)
Beneath the surface valley of Pagastecher Gorge, a flow of 100 gpm issued from a 6-in wide crevice (fault) in the gneiss. However, the flow diminished as storage was gradually exhausted. The City Pressure Tunnel was driven parallel to the strike of the Yonkers and Fordham Gneiss, Inwood Limestone, Manhattan Schist and Ravenswood Diorite. The City Tunnel section under the Harlem River penetrated the Inwood Limestone, which was generally dry but yielded a flow up to 200 gpm from seams in a blocky stretch. The wettest stretch in the City Tunnel was a crushed zone in the granodiorite, 600 gpm from one seam.
Shaft number 4 in the Rondout Pressure Tunnel reached the water-bearing Binnewater Sandstone at 215 ft. The shaft was deepened through this aquifer which was grouted. Further grouting and deepening of the shaft continued to 320 ft when the inward leakage reached 525 gpm of water charged with H_2S gas. When the Shawangunk Grit was reached an additional flow of 125 gpm entered, increasing total inflow to 850 gpm when all water-bearing seams were grouted. Leakage was reduced to 400 gpm. The wide seams took grout freely.)

SANFORD, J. H.

1938a Diffusing pits for recharging water into underground formations: Am. Water Works Assoc. Jour., v. 30, p. 1755-1766.
(Discusses the use of recharge basins, the reason for restricting water use, and the difficulties experienced in regulating ground-water usage on Long Island.)

1938b Report on the geology and hydrology of Kings and Queens Counties, Long Island: New York Water Power and Control Comm. Bull. GW-7, 68 p.
(Lists the Cretaceous and Pleistocene aquifers on Long Island and briefly describes their water-bearing characteristics.)

SANFORD, SAMUEL

(See Fuller, M. L., 1906b)

SAWYER, R. M.

(See also Brice, H. D., 1956)

(See also Pirnie, Malcolm, 1947)

SAWYER, R. M.
1963 Effect of urbanization on storm discharge and ground-water recharge in Nassau County, New York: U.S. Geol. Survey Prof. Paper 475-C, art. 106, 3 p., 1 fig., 2 tables.
(Urbanization in the East Meadowbrook drainage basin has decreased recharge to the ground-water reservoir from which most water supplies on Long Island are taken. The loss of recharge during the period 1952-60 was equivalent to about 63,000 gpd.)

SCHAIBLE, G. J., JR.
(See Romer, Harold, 1965)

SCHENECTADY CHAMBER OF COMMERCE
1929 The water supply of Schenectady, New York, a geologic and engineering report: Bur. Eng., Dept. Public Works Rept., 35 p., 14 figs.
(After determining the areal extent of the aquifer, test borings were made to discover its thickness and static water level. Discusses the relationship of the ground water and river water. Contains two chemical analyses and four bacterial analyses.)

SCHNEIDER, W. J.
(See Barksdale, H. C., 1966)

SCOTT, R. C.
1962 (and Barker, F. B.) Data on uranium and radium in ground water in the United States, 1954 to 1957: U.S. Geol. Survey Prof. Paper 426, 115 p., 2 illus., 7 figs., 2 tables.
(The conterminous United States is divided into 10 geotectonic regions to facilitate statistical interpretation of the occurrence of uranium and radium in the ground water. For each region the range and median for the concentrations of each element are calculated. Twelve wells from New York State were used in the analyses. Counties include Essex, Hamilton, Wayne, Onondaga, Ontario, Rensselaer, Columbia, Putnam, Orange, and Nassau.)

SEABER, PAUL
1965 (and Hollyday, E. F.) Hardness of ground water in the glacial deposits of the Susquehanna River basin, New York and Pennsylvania: U.S. Geol. Survey open-file rept.
(Hardness of ground water related to drift lithology, direction of glacial movement, topographic setting, and glacial history. Four distinct areas of hardness occur in region. Hardness data correlate well with lithology of glacial history to substantiate previous mapping.)

SEAMAN, VALENTINE

1809 A dissertation on the mineral waters of Saratoga, including an account of the waters of Ballston: New York, Collins and Perkins, 131 p.

(Briefly describes the mineral waters of Saratoga Springs. Discusses the method used to analyze the water.)

SHALER, N. S.

1887 Caverns and cavern life: Scribner's mag., v. 2, p. 449-472.

(Describes the origin of various cavities, including those formed by percolating ground waters (caverns), hydrothermal solution, faults and joints, caves formed by waves, caves formed by wind, and by lava tubes.
Limestone caverns are discussed in greater detail than the other types of openings. Among the subjects discussed with regard to caverns are their origin, formation of stalagtites and stalagmites, circulation of air, and development of life. Shaler states that caverns are formed by percolating ground water charged with CO_2 derived from decomposing vegetation on the land surface. Stalagmites and stalagtites are formed by evaporation of percolating water. Evaporation is possible because of circulation of air through caves. He noted effect of velocity of the stream in cavern on size and character, and the effect of surface streams in controlling base level of caverns, implying little or no development below the water table. On p. 465 Shaler states: "So far as the present writer has been able to observe American caverns, they have been limited to the regions south of the vast field occupied by the ice sheet of the last glacial period. But in New York and elsewhere there are some small caverns which were within that field of ice. It is an important task for students to find whether these caverns existed before the ice period, or whether they have been formed since that time. If they survived the glacial period, as seems likely, then they afford valuable evidence to show that the ice did not wear away as great a depth from the surface of the country as is commonly supposed.")

SIMMONS, E. T.

(See also Reck, C. W., 1952)

1961 (and Grossman, I. G., and Heath, R. C.) Ground-water resources of Dutchess County, New York: New York Water Resources Comm. Bull. GW-43, 82 p., 3 pl., 5 figs.

(Large supplies of ground water are available from unconsolidated rocks in major valleys in Dutchess County. Bedrock yields small supplies of ground water, up to 22 gpm from wells in limestone. Water from the Stockbridge Limestone and overlying unconsolidated deposits is hard and comparatively high in dissolved solids. The 1950 use of ground water in the county is about 7 mgd and the overall supply is capable of supporting larger demands.)

SIMPSON, E. S.

1949 Buried preglacial ground-water channels in the Albany-Schenectady area in New York: Econ. Geology, v. 44, no. 8, p. 713-720, 2 figs. (Reprinted as New York Water Power and Control Comm. Bull. GW-20A.)

(A buried channel of the preglacial Mohawk River, with its tributaries, is mapped from Schenectady to its confluence with the Hudson River 12 miles south of Albany. Permeable deposits in the buried channels are important aquifers in the area.)

1952 The ground-water resources of Schenectady County, New York: New York Water Power and Control Comm. Bull. GW-30, 110 p., 2 pl., 31 figs.

(Although ground water may be obtained from both the bedrock and surficial deposits in the county, large supplies can be pumped only from sands and gravels in the surficial deposits. The bedrock, mostly shale, is dense and has comparatively few openings. Some wells in gravel along the Mohawk River yield more than 3,000 gpm, whereas the average yield of wells in bedrock is less than 25 gpm. The yield of wells in bedrock is shown to be related to the type of overburden. Temperature of equilibrium is defined (p. 82), and theoretical temperatures of induced recharge from the Mohawk River to a nearby well field are compared with recorded ground-water temperatures of the Schenectady well field.

Data for the 209-sq mi county include 300 selected well records, 58 well logs, a 21-year well hydrograph, particle-size analyses, 55 comprehensive chemical analyses, 1 complete chemical analysis, measurements of ground-water temperature, and results for an aquifer test of gravel in the Mohawk Valley at Schenectady. Maps show bedrock surface (scale about 1:125,000), surficial deposits (scale about 1:300,000), and bedrock geology (scale 1:125,000). The latter two maps are based on existing sources.)

1959 (and Beetem, W. A., and Ruggles, F. H., Jr.) Hydrologic and tracer studies in Mohawk River at Knolls Atomic Power Laboratory: U.S. Atomic Energy Comm., Schenectady Naval Reactors Operations Office Rept. 50-45, 285 p., 62 figs.

(Contains several chemical analyses of ground water and a brief discussion of the chemical quality of ground water in the vicinity of the Knolls Atomic Power Lab.)

SINGWALD, Q. D.

(See Hoffmeister, J. E., 1941)

SLATER, F. J.

1932 (and Gates, J. W., O'Brien, D. T., and Samberg, H. A.) Report of the Joint Legislative Committee to Investigate the Existing Water Supplies of the State of New York: New York State Legislative Doc. 104, 23 p.

(Discusses the possibilities of making a statewide investigation, but is primarily concerned with water shortage on Long Island. Describes the procedure used in gathering ground-water data. Contains present consumption figures and projected future demands.)

SLICHTER, C. S.

(See also Veatch, A. C., 1906b)

1905 Field measurements of the rate of movement of underground waters: U.S. Geol. Survey Water-Supply Paper 140, 122 p., 15 pl.

(Discusses the capacity of sand to transmit water; describes the underflow meter devised by the author and laboratory experiments on the flow of water through sands and gravels; and gives results of measurements of underflow on Long Island.)

SMYTH, C. H., JR. (See Cushing, H. P., 1910)

SOREN, JULIAN

(See also Perlmutter, N. M., 1963d)

1961 The ground-water resources of Sullivan County, New York: New York Water Power and Control Comm. Bull. GW-46, 66 p., 2 pl., 4 figs.

(Temporary summer populations, 13 times normal in Sullivan County, withdraw most of the 4 billion gallons of ground water used annually with no apparent depletion of the resource. Wells in unconsolidated deposits yield as much as 700 gpm, those in bedrock as much as 120 gpm. Ground water from unconsolidated deposits and most of the bedrock (of Upper Devonian age) is high in iron. Ground water from the bedrock in the extreme southeastern part of the county is hard and contains objectionable amounts of hydrogen sulfide.)

1963 The ground-water resources of Delaware County, New York: New York Water Resources Comm. Bull. GW-50, 59 p., 2 pl., 4 figs., 6 tables.

(A population of 44,000 in Delaware County obtains 66 percent of its water from wells and springs, and there are no indications of depletion of the ground water through this usage. The principal bedrock aquifers are continental clastics in which most wells yield less than 50 gpm of soft water with moderate to high concentrations of iron and low dissolved solids. In areas where marine rocks are close to the surface, hard water with high chlorides, dissolved solids, and some H_2S and natural gas are found. The

SOREN, JULIAN (Cont'd.)

most productive aquifers are the coarse, unconsolidated, stratified drifts of Pleistocene age. Although development of this aquifer is not presently extensive, wells in this drift commonly yield 100 gpm and some report up to 1,000 gpm. Data include records of 184 springs, 355 wells, and 40 drillers' logs.)

SPAETH, J. N.

1938 (and Diebold, C. N.) Some interrelationships between soil characteristics, water table, soil temperature, and snow cover in the forest and adjacent open areas in south-central New York: Cornell Agr. Expt. Sta., Mem. 13, June.

(A study of water-table conditions in different types of soil to accurately determine the significance of the depth of the mottled soil horizon. Discusses the significance of duration and fluctuation of perched water tables and their relationship to impermeable soil horizons.)

SPIEGEL, S. J.

(See Hoffman, J. F., 1958)

STEARNS, H. T.

(See Stearns, N. D., 1937)

STEARNS, N. D.

1937 (and Stearns, H. T., and Waring, G. A.) Thermal springs in the United States: U.S. Geol. Survey Water-Supply Paper 679-B.

(Lists data on one thermal spring in New York State. The Lebanon Warm Spring has a temperature of 75°F and discharges approximately 500 gpm. It issues from gravel near a contact of limestone and talc slate.)

STEELE, J. H.

1819 An analysis of the mineral water of Saratoga and Ballston: Albany, D. Steele. (Reprint in 1838.)

(Total solids content of water from 10 springs at Saratoga ranges from 338 grains at Congress Spring to 117 grains at Columbian Spring. Water from many of the springs has a noticeable gas content. The temperatures range from 47° to 52°F. Water from the four Ballston Springs is less mineralized. A table of comparative properties of spring water, including water from 12 foreign springs, is presented.)

1829 Description of high rock spring at Saratoga Springs, in the county of Saratoga, and State of New York: Am. Jour. Sci., v. 16, p. 341-345.

(Describes the mineral spring and briefly mentions the geology of the area. Contains a short section on the therapeutic value of the mineral water.)

STEELE, J. H.

1861 An analysis of Congress Spring: New York, William W. Rose, 26 p.
(Contains two analyses of the saline and gaseous water from Congress Spring showing 385 grains chloride of sodium and 598 grams total solids. The water is reported to have a constant temperature of about 50°F when air temperatures ranged from 14°F below zero to 90°F above, and a cathartic effect.)

STEVENS, D. B.

(See also Peters, J. H., 1965)

1966 (and Peters, J. H.) Long Island recharge studies: Water Pollution Control Federation Jour., v. 38, Dec. 1966, p. 2009-20, 6 figs., 6 tables.
(Describes Long Island recharge project to prevent intrusion of salt water with advanced waste treatment.)

STEWART, H. G., JR.

(See Winslow, J. D., 1965)

STOLLER, J. H.

1932 Geological excursions: Schenectady, Union Book Company, p. 19-23, 85-91.
(Schenectady's water supply has its source in a fluvial sand and gravel deposit adjacent to the Mohawk River. The porosity of the gravel is about 30 percent. Knowing the areal extent of the gravel formation and assuming an average thickness, it is calculated that the gravel formation has a capacity of holding 63 billion gallons of water.
The mineral springs at Saratoga are described. These springs occur along a fault line and owe their existence to the fissuring and shattering of the rocks. The source of the water is believed to be meteoric and its mineral qualities are due to dissolving certain chemical compounds from the rocks the water passes through. Contains the chemical analysis of one well at Saratoga Springs.)

SUTER, RUSSELL

1937a Long Island's ground-water problem: Eng. News-Record, v. 118, May.
(Long Island ground-water resources are being damaged by unregulated pumping. The water levels are below sea level all over Kings County and is 40 ft below sea level in parts of the county. Most of the water under Brooklyn and Queens has become saline. Unrestricted industrial use is responsible for the severity of the problem.)

SUTER, RUSSELL

1937b Engineering report on the water supplies of Long Island: New York Water Power and Control Comm. Bull. GW-2, 63 p., 35 figs.
(Discusses the overdraft on the aquifers on the west end of Long Island due to the increased demand for water. Indicates areas of extreme overdraft and areas with a surplus of ground water. Infers the channeling of storm water to the sea is largely responsible for the overdraft.)

1938a Larger water-supply units in New York State: Water Works Eng., Sept., p. 1232-1236.
(Describes the water situation in New York, particularly from the standpoint of public supplies.)

1938b (and Laase, W. F.) Underground water resources of Long Island: Am. Water Works Assoc. Jour., v. 30, p. 289-297.
(Discusses ground-water usage on Long Island. Describes the water-bearing formations and their source or recharge. The western end of Long Island has been pumped for many years at a rate greatly in excess of the safe yield.)

1949 (and De Laguna, Wallace, and Perlmutter, N. M.) Mapping of geologic formations and aquifers of Long Island, New York: New York Water Power and Control Comm. Bull. GW-18, 212 p., 24 pl., 5 tables.
(This report contains detailed descriptions of the geology and geologic history of Long Island. Included are descriptions of formation, geologic correlation of well logs, topographic map, surface drainage map, and topographic maps of (1) the Precambrian surface, (2) the Lloyd Sand surface, (3) the Raritan surface, (4) the Magothy surface, (5) the Jameco Gravels surface, and (6) the Gardiner Clay surface. In addition over 2,000 well records are tabulated.)

SWARZENSKI, W. V.

(See also Lusczynski, N. J., 1960, 1962, 1966)

1959 Ground-water supplies in Pleistocene and Cretaceous deposits of northwestern Nassau County, New York: New York Acad. Sci. Annals, v. 80, art. 4, p. 1077-1091, 6 figs.
(Gives data on 29 wells, and depths and formations penetrated. Describes Pleistocene and Cretaceous aquifers. A C^{14} date for the Gardiners Clay of Pleistocene age showed an age of more than 38,000 years.)

SWARZENSKI, W. V.
1964 Hydrogeology of northwestern Nassau and northeastern Queens Counties, Long Island, New York: U.S. Geol. Survey Water-Supply Paper 1657.
(Detailed investigation of the geology and ground-water resources of northwestern Nassau and northeastern Queens Counties. Includes detailed description of aquifers and the presence and movement of water in them. Includes chemical analysis of ground water and chloride content of selected samples.)

TANNENBAUM, J. A.
(See Heath, R. C., 1963b)

TARR, R. S.
(See also Williams, H. S., 1909)

1904 Artesian well sections at Ithaca, New York: Jour. of Geology, v. 12, p. 69-82, 4 figs.
(Contains logs of 13 wells drilled southwest of Ithaca. Discusses the origin of the sand, gravel, clay, and till deposits in the valley and the sources of the water in the deposits.)

1905 Water resources of the Watkins Glen quadrangle, N.Y., in Fuller, M. L., Contributions to the hydrology of eastern United States, 1904: U.S. Geol. Survey Water-Supply Paper 110, p. 134-140.
(Although the paper briefly describes the water resources of the area, most of the discussion is related to the occurrence of ground water in outwash deposits in the vicinity of Ithaca.)

TAYLOR, F. B.
(See also Kindle, E. M., 1913)

1904 Water resources of the Taconic quadrangle, New York, Massachusetts, and Vermont, in Fuller, M. L., Contributions to the hydrology of eastern United States: U.S. Geol. Survey Water-Supply Paper 110, p. 130-133.
(Brief discussion of the occurrence of springs.)

TAYLOR, H. W.
1929 Improving the water works system of Scotia, New York: Public Works, v. 60, no. 9, p. 358-361.
(The apparent lack of water at Scotia was not due to an insufficient water supply but to inadequate pumping and storage facilities. The decision to replace the centrifugal pump with three deep-well lift pumps and to increase the storage capacity by constructing a large-diameter well alleviated the water shortage.)

TAYLOR, NORMAN

1938 A preliminary report on the salt-marsh vegetation of Long Island, New York: New York State Mus. Bull. 316, p. 51-58, 2 pl.

(Contains measurements of water levels on Long Island. Lists the specific gravity of the water in the various test holes on Long Island.)

TAYLOR, W. C.

1931 The water supply of Schenectady: Am. Water Works Assoc. Jour., v. 23, no. 6, June, p. 857-869.

(The original water supply was obtained from springs. Later, water was obtained from the Mohawk River. A typhoid epidemic in 1890-91 necessitated development of a new supply. Wells were dug on the flood plain of the river 2 miles west of the city in the town of Rotterdam. The construction of the wells, and geologic and hydrologic studies made to determine the source of the water and the extent of the aquifer, are described.)

TESMER, I. H.

1957 Sample study and correlation of three wells in Chautauqua County, New York: New York State Mus. and Sci. Service Bull. 362, 20 p., 4 pl.

(Contains the logs of three wells in Chautauqua County.)

THOMAS, H. E.

1951 The conservation of ground water: New York, McGraw-Hill Book Company, Inc., 327 p., 3 pl.

(Contains a generalized small-scale map showing the distribution of ground-water resources by aquifer, yield, and recharge by perennial streams in the State. Contains a brief discussion of the ground-water situation in Brooklyn.)

1952 Ground-water regions in the United States--their storage facilities, pt. 3 of The physical and economic foundation of natural resources: Interior and Insular Affairs Comm., House of Representatives, U.S. Cong., p. 63-67.

(In the glaciated Appalachian region, which includes the eastern part of New York, moderate to large yields are obtained from wells drawing from sediments or from glacial outwash, and from bedrock. The occurrence of ground water available from the Coastal Plain region, which includes Long Island, is briefly described.)

THOMPSON, D. G.

1933a (and Wells, F. G.) Statement concerning cooperative investigation of ground-water resources of Long Island, New York: New York Legislative Doc., no. 110 (Rept. of the Joint Legislative Comm. to Investigate Potable Water Resources), p. 17-34.
(Article forms a part of the "Complete Rept. of the Special Joint Legislative Comm. to Investigate the Potable Water Resources of the State of New York." Reviews the progress of investigations on Long Island and problems affecting development of ground-water supplies.)

1933b (and Wells, F. G.) A complete report of the Special Joint Legislative Committee to Investigate the Potable Water Resources of the State of New York: New York Legislative Doc. 110, p. 17-34.
(Discusses the importance of ground-water supplies of Long Island and the problems under investigation. Briefly describes the complicated nature of the geologic and hydrologic conditions on Long Island.)

1936 (and Leggette, R. M.) Withdrawal of ground water on Long Island, N.Y.: New York Water Power and Control Comm. Bull. GW-1, 28 p.
(Briefly discusses the water-bearing formations and the use of ground water in the area. Presents extensive data on the amounts of water withdrawn during 1904-34.)

1937 (and Wells, F. G., and Blank, R. H.) Recent geologic studies on Long Island with respect to ground-water supplies: Econ. Geology, v. 32, no. 4, June-July, p. 451-470, 8 figs. Abs. in GSA Proc., June 1936, p. 110-111.
(Clay beds are widespread on Long Island, but erosion channel through them permit some recharge to underlying sandy strata. About 65 percent of the pumped water supply of more than 200,000,000 gpd comes from surficial beds of Illinoian or Wisconsin age. Because of restricted recharge to the lower beds and the desirability of saving them for use in localities where the upper beds may easily become contaminated by salt water, any future large developments should be from the surficial beds.)

1938 (and Fiedler, A. G.) Some problems relating to legal control of use of ground waters: Am. Water Works Assoc. Jour., v. 30, no. 7, July.
(Discusses the general principles of ground-water laws in the United States. New York has enacted legislation which restricts the amount of water withdrawn on Long Island. Ground-water use for air conditioning is approved on condition that the water be returned to the ground through diffusion wells.)

THWAITES, F. T.

1935 Ground-water supplies of Allegany State Park, 1932: New York State Mus. Circ. 11, 62 p., 17 figs., 11 tables.

(Discusses the occurrence and utilization of ground water in Allegany State Park with particular emphasis on sanitary quality. Bacterial analyses showed that many wells and springs in the park were polluted. Most of the pollution appeared to be of surface origin, largely resulting from the entry into the top of the wells and springs of salamanders and other reptiles and animals. In a few instances the pollution was suspected to be subsurface in origin due to seepage from toilet pits.)

TOMASSI, ANTONIO

(See Riddick, T. M., 1958)

TRAINER, F. W.

1961 (and Heath, R. C.) Effect of Lake St. Lawrence on ground water in the Beekmantown Dolomite, northern St. Lawrence County, New York: U.S. Geol. Survey Prof. Paper 424-D, art. 315.

(Damming the St. Lawrence River raised ground-water levels nearby. The rise in dolomite extended to the first stream south of the lake, a discharge line, and went farther only at depth because the rock has greater horizontal than vertical permeability. Locally, water may move through the dolomite from Canada into the United States.)

1962 (and Salvas, E. H.) Ground-water resources of the Massena-Waddington area, St. Lawrence County, New York, with emphasis on the effect of Lake St. Lawrence on ground water: New York Water Resources Comm. Bull. GW-47, 227 p., 3 pl., 32 figs., 12 tables.

(This report includes 1,360 well records, 51 drillers' logs, and 71 chemical analyses. From these data it was concluded that the more important aquifers are in the bedrock. The most important aquifer is in the upper part of the bedrock and contains water under confined conditions. The flooding of Lake St. Lawrence caused a reversal in slope of the water table near the lake and created artesian flow in some wells. The ground water is of good quality although it is excessively hard.)

1964 (and Eddy, J. E.) A periscope for the study of borehole walls, and its use in ground-water studies in Niagara County, New York: U.S. Geol. Survey Prof. Paper 501-D, p. D203-D207.

(Describes use of periscope in Niagara County boreholes; correlates with temperature profiles; short summary of geohydrologic character of dolomite.)

TROWBRIDGE, W. P.
1887 Subsurface water supplies: Eng. News, v. 17, May.
(Describes the series of 2-inch wells from which Brooklyn pumps 18,000,000 gpd, and how precipitation and geology affect the amount of water available.)

U.S. CONGRESS, HOUSE OF REPRESENTATIVES
1934 Development of rivers in the United States: U.S. Cong., House Doc. 395, 73d Cong., 2d sess.
(Briefly mentions the Long Island ground-water supply. It is the largest development for public supply in the United States.)

U.S. CONGRESS, HOUSE OF REPRESENTATIVES, INTERIOR AND INSULAR AFFAIRS COMMITTEE
1952 Ground-water regions of the United States--their storage facilities: U.S. Govt. Printing Office, 1953, 70 p.
(Glacial outwash deposits on Long Island are the main source of ground water. The western end of the island has serious salt-water contamination problems. Water levels which had been above sea level in 1903 were as much as 50 ft below sea level in 1941.)

U.S. CONGRESS, SENATE
1891-92 Waterworks east of "arid region" having their supply from artesian and underflow sources: U.S. Cong., Senate Doc. 41, pt. 1, 52d Cong., 1st sess.
(Contains tabular data on about 85 municipalities with ground-water supplies. Lists the source of supply, consumption, capacity of the reservoir, and whether pumped or gravity flow.)

1957 Land and water resources of the New England-New York region: U.S. Cong., Senate Doc. 14, 85th Cong., 1st sess., 429 p., 66 pl.
(Contains a summary of the water resources of New York with graphs and charts showing past use and projected future use. Discusses natural and manmade pollution problems with suggestions for their correction. Briefly mentions bedrock formations and unconsolidated deposits.)

U.S. DEPARTMENT OF AGRICULTURE
1955 Water: U.S. Dept. of Agr., 1955 Yearbook, 751 p.
(Brief reference is made to salt-water encroachment on western Long Island, the laws relating to construction of new wells, infiltration, and frozen ground and runoff relationships.)

U.S. GEOLOGICAL SURVEY

1937 Record of wells in Kings County, New York: New York Water Power and Control Comm. Bull. GW-3, 175 p.
(First of a series of four reports containing records of wells on Long Island not contained in U.S. Geol. Survey Prof. Paper 44. Published to accompany Bull. GW-2, eng. rept. on the water supplies of Long Island. Gives tabulated data on about 700 wells. Includes logs and other information for many of the wells and a map showing locations of wells.)

1938a Record of wells in Suffolk County, New York: New York Water Power and Control Comm. Bull. GW-4, 19 p.
(Second of a series of four reports containing records of wells on Long Island. Gives tabulated data on about 200 wells and many well logs. Includes map showing locations of wells.)

1938b Record of wells in Nassau County, New York: New York Water Power and Control Comm. Bull. GW-5, 140 p.
(Third of a series of four reports containing records of wells on Long Island. Includes data on about 200 wells in Nassau County, many well logs, and map showing locations of wells.)

1938c Record of wells in Queens County, New York: New York Water Power and Control Comm. Bull. GW-6, 240 p.
(The last of a series of four reports containing records of wells on Long Island. Gives records of numerous wells and tabulated data on 604 wells. Includes map showing locations of wells.)

1950 Water facts in relation to a national water-resources policy: U.S. Geol. Survey, mimeo. rept., 127 p., 20 figs., 3 app.
(Appendix C discusses the current situation, deficiencies in information, and corrective measures and further development of public water supplies, ground water in the upstate area, the New York City area, northwestern New York, Long Island, flood control, and pollution. Contains data on present use and estimates of future use. Local water-level declines are noted but no regional overdevelopment is known.)

1951 Index of water-resources records in the Delaware River basin to September 30, 1951: U.S. Geol. Survey Circ. 190, 19 p.
(Surface water, ground water, and quality of water data collected by the U.S. Geol. Survey and cooperating agencies in the Delaware River basin to Sept. 30, 1951, are indexed in this report in two sections. These sections are (1) surface water, and (2) ground water. Each section includes quality of water information. A bibliography and list of agencies engaged in cooperative water-resources investigations with the U.S. Geol. Survey are included.)

U.S. GEOLOGICAL SURVEY

1962 Geological Survey research 1962, a synopsis of geologic, hydrologic and topographic results: U.S. Geol. Survey Prof. Paper 450-A, 257 p., 11 figs.
(Summaries of ground-water investigations in New York State occur under various headings. Each summary reports significant details and statements of progress of the various studies.)

1963 Geological Survey research 1963, summary of investigation: U.S. Geol. Survey Prof. Paper 475-A, 300 p., 13 figs.
(Summaries of ground-water investigations in New York State occur under subject headings. Each summary reports significant findings and may indicate the progress of the study.)

1964 Geological Survey research 1964: U.S. Geol. Survey Prof. Paper 501-A.
(The report contains brief descriptions of the following studies:
1. Ratio of high to low discharge on streams in the Schoharie Creek basin.
2. Source of ground water in the Jamestown area.
3. Ground-water supplies in the lower Oswego River basin.
4. Water resources in the Syracuse area.
5. The declining water levels in Nassau County.
6. Ground-water discharge to streams in the Lake Erie-Niagara River basins.
7. Detergents in the ground water of Nassau County.

1966 Relationships of fresh and salty ground water in the northern Atlantic Coastal Plain of the U.S.: U.S. Geol. Survey Prof. Paper 550-C, p. 235-243.
(Brief treatment of salt water-fresh water boundary of Long Island on a regional basis. Results show that boundary conforms closely with coast line only in late Pleistocene and recent deposits; boundary in older beds controlled by fresh-water circulation patterns.)

U.S. PUBLIC HEALTH SERVICE

1946 Inventory of water and sewage facilities in the United States: U.S. Public Health Service.
(Contains tabular data on the source and use of public water supplies for all towns in New York State with municipal distribution systems.)

1957 Municipal water facilities, communities of 25,000 population and over, continental United States and territorial possessions, as of December 31, 1956: U.S. Public Health Service, 163 p.
(This report contains an inventory of tabular data on the source of supply, draft, treatment, output and pumping

U.S. PUBLIC HEALTH SERVICE (Cont'd.)
capacity of public water supplies for facilities serving places having a 1950 population of 25,000 and over. There is also a 1956 edition as of November 1955 and a 1955 edition as of December 1954.)

1959a Natural fluoride content of communal water supplies in the United States: U.S. Public Health Service Pub. 655
(Contains tabular data of fluoride concentrations in 17 public water supplies in New York.)

1959b Municipal water facilities, communities of 25,000 population and over, as of January 1, 1958: U.S. Public Health Service Pub. 661, 83 p.
(This report contains an inventory of tabular data on the source of supply, draft, treatment, output and pumping capacity of public water supplies for facilities serving places having a 1950 population of 25,000 and over.)

1960a Municipal water facilities, communities of 25,000 population and over, United States possessions, as of January 1, 1960: U.S. Public Health Service Pub. 661, 91 p.
(This report contains an inventory of tabular data on the source of supply, draft, treatment, output, and pumping capacity of public water supplies for facilities serving places having a 1950 population of 25,000 and over.)

1960b Municipal water facilities inventory as of January 1, 1958: U.S. Public Health Service Pub. 775, v. 2, 149 p.
(Contains tabular data on the source of supply, draft in million gallons per day, plant capacity and output, and treatment of public water supplies for facilities serving places having a 1950 population of 100 or more which have been reported by the State Dept. of Health.)

1964 Municipal water facilities, 1963 inventory, a cooperative state-federal report: U.S. Public Health Service Pub. 775 (revised), v. 2, p. 41-110, 2 tables.
(An inventory of all public water supplies in New York State. Describes needs, sources, treatment, and use in table form.)

UPSON, J. E.
(See also Perlmutter, N. M., 1959c)

1955 Ground-water sources on Long Island: Am. Water Works Assoc. Jour., v. 47, no. 4.
(Describes the formations that yield water to wells on Long Island.)

UPSON, J. E.

1959a Relation of Long Island ground-water resources to regional needs: Am. Water Works Assoc. Jour., v. 51, pt. 1, 14 p., 5 figs.

(The occurrence of ground water in the New York City metropolitan area, the relation of Long Island sources to the existing pattern of water use, what is known about Long Island's ground water, and some of the technical problems involved in full development of the ground-water resources are described. Figures show (1) the distribution of productive deposits, moderately productive rocks, and rocks of low productivity, (2) the amount of ground water withdrawn from 1918-56 for the New York City supply, and (3) geologic units and ground-water reservoirs of central Nassau County. Water-supply systems and ground-water withdrawal by use are tabulated by county. Problems of full utilization of ground water are discussed.)

1959b Ground-water problems in New York State and New England: Am. Soc. Civil Engineers Proc., NY-6, 12 p., 4 figs.

(Location of productive water-bearing strata can be based on ground-water studies alone, but estimation of total available water can best be accomplished by measuring river outflow and estimation of evapotranspiration losses from swamps and lakes.)

VAN DER LEEDEN, FRITS

1962 The ground-water resources of Westchester County, New York: Unpublished Masters Thesis at N.Y. Univ., 90 p., 5 illus., 15 figs., 17 tables.

(Ninety percent of the wells in Westchester County tap bedrock. The median yield is 10 gpm but ranges from 3 gpm in phyllites to 15 gpm in marbles. Specific capacities range from 0.21 for wells in diorite to 0.78 for wells in marble. Average well depth is 204 ft.)

VAN EPPS, P. M.

1933 The flowing springs of Glenville: Town of Glenville Historian Rept. no. 7.

(The report briefly describes the tilted and somewhat contorted bedrock structure of the Schenectady Shale and irregular nature of the occurrence of springs. Most springs in the town are found on the southern slopes of the hills facing the Mohawk River. Some springs are found in the deposits of the Mohawk River. Artesian wells are reported in the vicinity of Scotia, Hoffmans, and Schenectady. The few springs found on the north slope of the "Glenville Hills" are believed to issue from vertical joint planes. Springs also occur along the Hoffman's Ferry fault in the western part of the town.)

VANUXEM, LARDNER

1839 Salt wells, or borings of Onondaga: New York State Geol. Survey, 3d ann. rept., Assembly Doc. 275, v. 5, p. 262-272.
(Describes the salt wells in Onondaga County. The wells were finished in either unconsolidated deposits or in the upper portions of a red shale. The occurrence of brine in two totally different materials indicates a common source. Contains the log of one well at Salina.)

VEATCH, A. C.

(See also Fuller, M. L., 1905c)

1904 Some peculiar artesian conditions on Long Island, New York: Science, v. 19, no. 490, p. 795-796.
(Briefly describes the artesian and water-table aquifers on Long Island and states that they are both essentially continuous. Where the water table slopes steeply, slight changes in permeability can cause artesian conditions. The curved nature of the ground-water table can produce flows against the dip of the strata.)

1906a Fluctuation of the water level in wells, with special reference to Long Island, N.Y.: U.S. Geol. Survey Water-Supply Paper 155, 83 p., 9 pl.
(Gives data on ground-water levels and discusses fluctuations due to rainfall, evaporation, barometric changes, temperature changes in rivers, changes in lake levels, tidal changes, irrigation, the construction of dams, ground-water developments, deforestation, cultivation of the soil, drainage, and other causes.)

1906b (and Slichter, C. S., Bowman, Isaiah, Crosby, W. O., and Horton, R. E.) Underground-water resources of Long Island, N.Y.: U.S. Geol. Survey Prof. Paper 44, 394 p., 34 pl.
(Describes the geologic formations, the source and occurrence of ground water, and the conditions necessary to obtain flowing wells. Gives data in regard to the springs, streams, ponds, lakes, artesian and other deep wells, the water table and its fluctuations, blowing wells, and waterworks. Contains records of the rate of movement of the ground water and results of sizing and filtration tests, and gives well records and notes concerning representative wells. Includes water analyses and maps showing the geology, contours of the water table, and locations of wells and waterworks.)

VORHIS, R. C.

1957 Bibliography of publications relating to ground water prepared by the Geological Survey and cooperating agencies, 1946-55: U.S. Geol. Survey Water-Supply Paper 1492, 203 p.
(Lists papers that contain information on ground water. Contains an index of the papers listed insofar as they relate to ground water.)

WALLER, ROBERT

1960 Anionic detergents in ground-water supplies: New York State Dept. of Health, Water Works News of New York State, v. 15, no. 4.

(A report on the increased use of detergents and their contaminating effects on ground water in suburban areas. Contains data collected during the summer of 1960 of a sampling program of homes in a sandy area and an area where the wells are finished in bedrock. Both shallow and deep wells showed evidence of contamination from detergents.)

WALTON, G. E.

1883 The mineral springs of the United States and Canada: New York, D. Appleton and Company, 468 p.

(Briefly discusses the origin of mineral springs. The dissolved chemical constituents of water are listed which characterize the seven major types of springs. These are alkaline, saline, sulfur, chalybeate, purgative, calcic, and thermal springs. Contains chemical analyses and temperature measurements of some of the more prominent springs.)

WARING, G. A.

(See also Stearns, N. D., 1937)

1947 (and Meinzer, O. E.) Bibliography and index of publications relating to ground water prepared by the Geological Survey and cooperating agencies: U.S. Geol. Survey Water-Supply Paper 992, 412 p.

(Lists papers that contain information on ground water. Gives brief abstracts of these papers in regard to ground water with page references for papers dealing mainly with other subjects. Contains an index of the papers listed insofar as they relate to ground water.)

WATERMAN, W. G.

(See Johnson, A. H., 1952a)

WEEKS, F. B.

1903 New York, in Fuller, M. L., Contributions to the hydrology of the eastern United States: U.S. Geol. Survey Water-Supply and Irrigation Paper 102, p. 169-206.

(Contains records of water wells and springs from many of the counties in the State and several chemical analyses.)

1905 New York, in Fuller, M. L., Underground waters of eastern United States: U.S. Geol. Survey Water-Supply and Irrigation Paper 114, p. 82-92.

(Briefly describes the geology of the State as it relates to the occurrence of ground water. Contains a list of commercial springs, and a generalized geologic map showing the locations of the springs.)

WEISS, LAWRENCE

1954 Foraminifera and origin of the Gardiners Clay (Pleistocene), eastern Long Island, New York: U.S. Geol. Survey Prof. Paper 254-G.

(The Gardiners Clay is an interglacial marine deposit. It was deposited in shallow water presumably as discontinuous lenses and probably does not provide a tight hydraulic seal between the shallow water-table beds and the underlying Cretaceous aquifers.)

WELLS, F. G.

(See Thompson, D. G., 1933a, 1933b, 1937)

WELSCH, W. F.

(See also Lieber, Maxim, 1954)

1949 Conservation of ground-water resources, Nassau County, New York: Water Works Eng., v. 102, no. 8, p. 708-710, 741-746.

(About 25 basins are planned to store storm water for recharging the ground water reservoir. To date, 14 basins ranging in size from 2 to 9 acres have been built.)

1952 Outpost observation wells: Am. City, v. 67, no. 5, p. 106-107.

(The observation wells were installed to determine the position and fluctuation of the static water table over an extended period of time. It was also possible to determine the rate of salt-water encroachment in Nassau County. Artificial recharge basins are used to conserve storm waters in the area.)

1955a Diffusion wells: Am. City, Jan., p. 98

(Diffusion wells are used for recharging ground-water aquifers where the formations are of unconsolidated material. This provides a method of draining areas and conserving Long Island's ground-water supply. The diffusion wells consist of prefabricated reinforced concrete pipe. Tests show the wells work best when the bottom of the well is not less than 6 ft below the highest ground-water level.)

1955b Ground-water pollution from industrial wastes: Sewage and Industrial Wastes, v. 27, no. 9, p. 1065-1069, 1 fig.

(The discharge of plating wastes to the ground water is creating a dangerous situation in sections of Long Island. Chromium and cadmium were both found in high concentrations in ground water in Nassau County.)

WELSCH, W. F.
1956 Conservation of ground water; practices used on Long Island: Water and Sewage Works, v. 103, no. 10, pt. 2, p. 469-473, 5 figs.
(Due to the rapid growth of Long Island the demands for water for domestic and industrial use has increased greatly. Efforts to conserve ground-water supplies has led to methods which intercept runoff, which would normally go into the sea, and direct it back into the ground.)

1960 Conservation in Nassau County: Am. Water Works Assoc. Jour., v. 52, no. 12, 4 p.
(Briefly describes the transition in Nassau County, Long Island, from agricultural to light industry and residential land use, and the problems of water conservation and sewage disposal connected with such a transition. Describes salt-water encroachment in Brooklyn, some of the legislated control measures for this problem, and storm-water utilization in recharge.)

WENZEL, L. K.
1942 Methods for determining permeability of water-bearing materials: U.S. Geol. Survey Water-Supply Paper 887, p. 7.
(Coefficients of permeability of 23 well samples from Long Island tested by the Hydrologic Lab. ranged from 500 to 90,000.)

WETTERHALL, W. S.
1959 The ground-water resources of Chemung County, New York: New York Water Power and Control Comm. Bull. GW-40, 58 p., 1 pl., 6 figs.
(The bedrock, consisting principally of sandstone and shale of Devonian age, yields about 8 gpm to wells. Sand and gravel underlying the larger valley areas are the most productive water-bearing units in the county. Some properly developed wells drawing from the sand and gravel yield as much as 1,000 gpm.
Data in the report include records of more than 600 wells, logs of more than 150 wells and test holes, and chemical analyses of water from more than 50 wells. Maps include one of the county showing the yields of the unconsolidated deposits (scale approx. 1:175,000).)

WHITAKER, C. L.
(See Brice, H. D., 1956)

WHITCOMB, LAWRENCE
(See Buddington, A. F., 1941)

WHITE, LAZARUS

1913 The Catskill water supply of New York City: New York, John Wiley and Sons, Inc., 755 p.

(Describes some of the early water problems that plagued New York City. The first supplies were inadequate and it wasn't until the Catskill supply was available that New York City was adequately supplied.)

WHITE, W. F.

(See Lohr, E. W., 1953)

WHITNEY, F. L.

1904 The new artesian water supply at Ithaca, New York, in Fuller, M. L., Contributions to the hydrology of eastern United States: U.S. Geol. Survey Water-Supply Paper 110, p. 55-64.

(Discusses the old water supply and the reasons for abandoning it. The Ithaca basin contains large amounts of glacial sands and gravels. Wells drilled into them initially flowed over 400,000 gpd.)

WILCOX, D. F.

1917 The regulation of private water companies in New York City: Am. Water Works Assoc. Jour., v. 31, no. 4, p. 550-574.

(Private water companies have acquired perpetual rights to supply water to certain areas on Long Island. There is no effective State control over the rates or practices of these companies. They are subject to the New York State Health Dept. and The Conservation Comm. in matters relating to pollution.)

WILLCOMB, C. E.

1936 Iron and manganese in water: Am. Water Works Assoc. Jour., v. 28.

(Briefly discusses the removal of iron and manganese from ground water on Long Island.)

WILLIAMS, H. S.

1909 (and Tarr, R. S., and Kindle, E. M.) Geologic atlas of the United States; Watkins Glen-Catatonk folio, New York: U.S. Geol. Survey Geol. Atlas, Folio 169.

(Contains brief descriptions of the springs, shallow wells, and artesian wells in the area.)

WILLIS, BAILEY

(See Merrill, F. J. H., 1902)

WILM, H. G.

1956 Forests and water in New York State: New York State Conservationist, v. 11, no. 6, 2 p.

(A brief summary of the forest and watershed problems in the Adirondacks arising from removal of forests, cultivation of large area of land, and the settlement of valley bottoms. The climate, vegetation, soils, and geology of the Adirondacks are discussed.)

WINSLOW, J. D.
1962 Effect of stream infiltration on ground-water temperatures near Schenectady, N.Y.: U.S. Geol. Survey Prof. Paper 450-C, art. 111, p. 125-128, 3 figs.
(Ground-water temperature data collected in the vicinity of two municipal well fields near Schenectady have demonstrated that stream infiltration is occurring. In addition these data have delineated the principal flow path between the river and the well fields, and have revealed a marked difference between different sand and gravel beds within the aquifer.)

1965 (and Stewart, H. G., Jr., Johnston, R. H., and Crain, L. J.) Ground-water resources of eastern Schenectady County, New York, with emphasis on infiltration from the Mohawk River: New York Water Resources Comm. Bull. 57, 3 pls., 33 figs., 9 tables.
(Glacial deposits are described as most productive aquifers in area and are treated in detail. Yields are controlled chiefly by seasonal ranges of water temperatures and by changes of river levels from navigation.)

WOODRUFF, J. G.
1942 Geology of the Wellsville quadrangle, New York: New York State Mus. Bull. 326, p. 120.
(Briefly mentions ground water in the Wellsville area.)

YARGER, L. B.
(See Grossman, I. G., 1953)

ZIPSER, M. E.
(See Sanborn, J. F., 1920)

All references are included and indexed under subjects mentioned or recorded in the publications. The subjects are arranged alphabetically.

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1. Areas including all references dealing with studies which exceed counties in size. In this category are large drainage basins in New York State and Long Island.

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